

The Journal *of the* Society of Dyers and Colourists

Volume 76



Number 12

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Developments in fastness testing, particularly internationally, necessitated the publication in 1958 of a supplement to the handbook and since then further developments have occurred. **Instead of issuing a second supplement, however, the Society's Fastness Tests Co-ordinating Committee decided that it would be more convenient for the Society to issue a Second Edition of Standard Methods for the Determination of the Colour Fastness of Textiles** which is now available from the offices of the Society.

The Second Edition contains the tests, etc., which appeared in the *Journal* as Sponsored Publications since the supplement was published—

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and also three tests which are now appearing for the first time—

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whilst minor modifications have been made to certain others.

Many of the tests in the handbook have become Recommendations of the International Organisation for Standardisation and have been adopted as National Standards in many countries including the United Kingdom. A list of equivalent national standards is included in each test which should be of value where exports and imports are concerned.

To facilitate ease of reference, the tests have now been arranged alphabetically and a standard lay-out has been adopted.

THIS HANDBOOK IS UNDOUBTEDLY THE MOST COMPREHENSIVE AND UP-TO-DATE SOURCE OF INFORMATION ON COLOUR FASTNESS TESTING IN THE WORLD AND IS INDISPENSABLE WHEREVER COLOUR FASTNESS TESTS ARE MADE.

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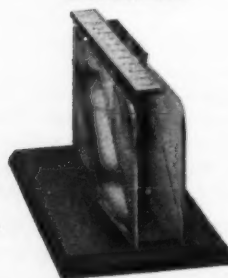
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FORTHCOMING MEETINGS OF THE SOCIETY

Tuesday, 10th January 1961

NORTHERN IRELAND SECTION. *Standards for Consumer Requirements.* J. S. Ingham, Esq., M.Sc., F.R.I.C., F.S.D.C. (Marks and Spencer Ltd.). Grosvenor Rooms, Belfast. 7.30 p.m.

Thursday, 12th January 1961

SCOTTISH SECTION. *Recent Developments in Wool Dyeing.* D. G. Evans, Esq., B.Sc. (CIBA Clayton Ltd.). Scottish Woollen Technical College, Galashiels. 7.30 p.m.

WEST RIDING SECTION. *Modern Piece Scouring Methods in Relation to Uneven Dyeing.* B. F. J. Moxon, Esq. (Wool Industries Research Association). The Victoria Hotel, Bridge Street, Bradford. 7.30 p.m.

Friday, 13th January 1961

LONDON SECTION. *Fibre Identification—a lecture demonstration.* F. W. Lindley, Esq., Ph.D., and C. Beaumont, Esq., B.Sc., A.R.I.C., A.T.I., A.S.D.C. (Courtaulds Ltd., Droylsden). (Joint meeting with the London Centre of the Guild of Dyers and Cleaners.) Royal Society, Burlington House, London W.1. 6.30 p.m.

Monday, 16th January 1961

BRADFORD JUNIOR BRANCH. *Moths and Mothproofing.* A. Gabriel, Esq., B.Sc. (Shell Chemical Co. Ltd.). Institute of Technology, Bradford. 7.15 p.m.

Tuesday, 17th January 1961

HUDDERSFIELD SECTION. *Defending the Frontiers of Civilisation.* J. David, Esq., B.Sc.(Tech.), A.M.C.T., A.T.I. (Catomance Ltd.). (Joint meeting with Halifax Textile Society.) Silvios Cafe, Huddersfield. 7.30 p.m.

LEEDS JUNIOR BRANCH. *Moths and Mothproofing.* A. Gabriel, Esq., B.Sc. (Shell Chemical Co. Ltd.). The Lecture Theatre, Department of Colour Chemistry and Dyeing, The University, Leeds 2. 3.15 p.m.

SCOTTISH SECTION. *Continuous Dyeing of Synthetic Fibres and Their Blends with Other Fibres.* J. Khacheyan, Esq. (C.F.M.C.). St. Enoch Hotel, Glasgow. 7.15 p.m.

Wednesday, 18th January 1961

MIDLANDS SECTION. (Title later). G. H. Lister, Esq., Ph.D. (Sandoz Ltd.). King's Head, Loughborough. 7 p.m.

Thursday, 19th January 1961

MANCHESTER SECTION. *Printing of Synthetic Fibres.* R. E. Fletcher, Esq., B.Sc., A.T.I. (CIBA Clayton Ltd.). Lecture Theatre, Manchester Literary and Philosophical Society, 36 George Street, Manchester 1. 7 p.m.

MANCHESTER JUNIOR BRANCH. *Fibre Identification.* F. W. Lindley, Esq., Ph.D. and C. Beaumont, Esq., B.Sc., A.R.I.C., A.T.I., A.S.D.C. (Research Dept., Courtaulds Ltd.). Room J/E.11, Jackson Street Extension, College of Science and Technology, Manchester. 4.30 p.m.

Friday, 20th January 1961

WEST RIDING SECTION. Annual Dinner and Dance. Victoria Hotel, Bradford.

Saturday, 21st January 1961

MANCHESTER SECTION. Annual Dinner and Dance. Jubilee Suite, Grand Hotel, Manchester. 6 p.m. for 6.30 p.m.

Thursday, 26th January 1961

WEST RIDING SECTION. *New Light on the Reactivity of Wool with Acids and Alkaline Solutions.* R. L. Elliott, Esq., B.Sc., Ph.D. (London), F.R.I.C., F.T.I., F.S.D.C. and R. S. Asquith, Esq., M.A., Ph.D., F.S.D.C. (Bradford Institute of Technology). The Victoria Hotel, Bridge Street, Bradford. 7.30 p.m.

Friday, 27th January 1961

LONDON SECTION. Annual Dinner and Dance. Waldorf Hotel, Aldwych, London W.C.2. 7 p.m. for 7.30 p.m.

Monday, 30th January 1961

HUDDERSFIELD SECTION. *Modern Piece Scouring Methods in Relation to Uneven Dyeing.* B. F. J. Moxon, Esq. (Wool Industries Research Association). (Joint meeting with the Huddersfield Textile Society.) College of Technology, Huddersfield. 7.30 p.m.

Friday, 3rd February 1961

LONDON SECTION. *Dyeing of Millinery and Allied Materials.* Short papers by members of Barford Bros. Ltd., Luton. Royal Society, Burlington House, London W.1. 6 p.m.

Tuesday, 7th February 1961

NORTHERN IRELAND SECTION. *Science in the Detection of Crime.* Dr. A. J. Howard (Director of the Department of Industrial Forensic Science). Joint meeting with the Textile Institute. Chamber of Commerce Board Room, Donegall Square West, Belfast. 7.30 p.m.

Wednesday, 8th February 1961

MIDLANDS SECTION. *Work Study in the Dyehouse.* B. Lockwood, Esq., B.Sc., and R. W. Richardson, Esq., Ph.D., B.Sc., A.R.I.C. (Furzebrook Knitting Co. Ltd.). College of Art and Technology, Leicester. 7 p.m.

Thursday, 9th February 1961

WEST OF ENGLAND AND SOUTH WALES SECTION. *Trade Effluents—The Legal Position and Method of Treatment.* J. H. Harwood, Esq., B.Sc., A.R.I.C. (Peter Spence & Sons Ltd.). County Hotel, Taunton. 6.30 p.m.

WEST RIDING SECTION. *The Problem of Illumination in Colour Matching.* K. McLaren, Esq., B.Sc., F.R.I.C., F.S.D.C. (Imperial Chemical Industries Ltd.). The Hotel Metropole, King Street, Leeds. 7.30 p.m.

Tuesday, 14th February 1961

BRADFORD JUNIOR BRANCH. *Modern Piece Scouring Methods in Relation to Uneven Dyeing.* B. F. J. Moxon, Esq. (Wool Industries Research Association). Institute of Technology, Bradford. 7.15 p.m.

NORTHERN IRELAND SECTION. *The Principles of Colour Photography.* D. P. Ayres, Esq., B.Sc., A.R.P.S. (Ilford Ltd.). Grosvenor Rooms, Belfast. 7.30 p.m.

SCOTTISH SECTION. *Mechanism of Crease-recovery.* J. A. Wilson, Esq., B.Sc., Ph.D. (British Rayon Research Assoc.). (Joint meeting with the Textile Institute.) Room M 406, Royal College of Science and Technology (New Building) Glasgow. 7.30 p.m.

Thursday, 16th February 1961

MANCHESTER JUNIOR BRANCH. *Three short papers by members of the Section.* (Prize donated by Manchester Senior Section.) Room J/E.11, Jackson Street Extension, College of Science and Technology, Manchester. 4.30 p.m.

Friday, 17th February 1961

MANCHESTER SECTION. *The Dye and the Fibre—Study of the Movement of Dye Molecules Within the Fibre.* Dr. R. McGregor (Lecturer in Textile Chemistry, The University of Manchester). Lecture Theatre, Manchester Literary and Philosophical Society, 36 George Street, Manchester 1. 7 p.m.

Tuesday, 21st February 1961

HUDDERSFIELD SECTION. *Some Aspects of the Chemistry of Afterchroming.* L. Peters, Esq., Ph.D., M.Sc. (Leeds University). Silvios Cafe, Huddersfield. 7.30 p.m.

Thursday, 23rd February 1961

WEST RIDING SECTION. *Recent Developments in Dyeing Acrylic Fibres.* B. Kramrisch, Esq., F.R.I.C., F.T.I., F.S.D.C. (CIBA Clayton Ltd.). The Victoria Hotel, Bridge Street, Bradford. 7.30 p.m.

Friday, 24th February 1961

LONDON SECTION. *Technical Aspects of Textile Marketing in Relation to the Dyeing and Finishing Industry.* H. A. Thomas, Esq., Ph.D., F.R.I.C., F.T.I., F.S.D.C. (Marketing Division Director, Courtaulds Ltd.). George Hotel, Luton. 6.30 p.m.

Monday, 27th February 1961

HUDDERSFIELD SECTION. *Application of Colour Theory to Fibres, Yarns and Fabrics.* P. Warburton, Esq., M.C., F.S.A.M. (Former Head of Bury Municipal School of Arts and Crafts). Joint Meeting with the Halifax Textile Society. Alexandra Hall, Halifax. 7.30 p.m.

FORTHCOMING MEETINGS OF THE SOCIETY—continued from page iv

Tuesday, 28th February 1961

LEEDS JUNIOR BRANCH. *The Applications and Uses of the Synthetic Vinyls in the Textile Industry.* J. H. MacGregor, Esq., Ph.D., F.R.I.C. (Courtaulds Ltd., Bocking). The Lecture Theatre, Department of Colour Chemistry and Dyeing, The University, **Leeds 2.** 3.15 p.m.

Friday, 3rd March 1961

LONDON SECTION. *Colour Measurement: its possibilities for the Colourist.* H. W. Ellis, Esq., Ph.D., A.R.C.S., A.R.I.C., F.S.D.C. (CIBA Clayton Ltd.). Royal Society, Burlington House, **London W.1.** 6 p.m.

MIDLANDS SECTION. Annual Dinner. Nottingham Co-operative Society, Upper Parliament Street, **Nottingham.** 7 p.m.

Tuesday, 7th March 1961

LEEDS JUNIOR BRANCH. *The Principles of Colour Photography.* D. P. Ayres, Esq., B.Sc., A.R.P.S. (Ilford Ltd.). The Lecture Theatre, Department of Colour Chemistry and Dyeing, The University, **Leeds 2.** 3.15 p.m.

NORTHERN IRELAND SECTION. *The Finishing of 'Terylene' Flax Fabrics.* I. E. Haden, Esq., B.Sc., A.T.I. (Imperial Chemical Industries Ltd.). Grosvenor Rooms, **Belfast.** 7.30 p.m.

Thursday, 9th March 1961

MANCHESTER JUNIOR BRANCH. Annual General Meeting. *The Standfast Molten Metal Dyeing Machine.* Lecture and Film. A. Ogden, Esq. (Standfast Dyers and Printers Ltd.). Room J/E.11, Jackson Street Extension, College of Science and Technology, **Manchester.** 4.30 p.m.

MIDLANDS SECTION. *Flameproofing.* J. E. W. Perfect, Esq., B.Sc. (Proban Ltd.). (Joint meeting with the Coventry Textile Society). Courtaulds Acetate and Synthetic Fibres Laboratory, Lockhurst Lane, **Coventry.** 7 p.m.

WEST RIDING SECTION. *Stimulus and Response—Reactions to Some Current Problems in Textile Finishing.* G. W. Madaras, Esq., Ph.D., and S. N. Bradshaw, Esq. (Courtaulds Ltd., Coventry). The Victoria Hotel, Bridge Street, **Bradford.** 7.30 p.m.

Tuesday, 14th March 1961

NORTHERN IRELAND SECTION. *General Principles in the Screen Printing of Fabrics made from Natural and Synthetic Fibres.* P. Pyle, Esq., A.R.I.C. (Decorative Fabrics Ltd.). Grosvenor Rooms, **Belfast.** 7.30 p.m.

SCOTTISH SECTION. (Title later). G. H. Lister, Esq., Ph.D. (Sandoz Ltd.). St. Enoch Hotel, **Glasgow.** 7.15 p.m.

Wednesday, 15th March 1961

BRADFORD JUNIOR BRANCH. *The Dyeing of Worsted Pieces.* H. S. Smith, Esq. (CIBA Clayton Ltd.). Institute of Technology, **Bradford.** 7.15 p.m.

MIDLANDS SECTION. *Early Attempts to Dye Secondary Acetate.* E. Stanley, Esq., M.Sc., and A. J. Wesson, Esq. (British Celanese Ltd.). Celanese Sports Pavilion, **Spondon.** 7 p.m.

Friday, 17th March 1961

MANCHESTER SECTION. *Textile Finishing Symposium.* (Details to be announced later). Great Hall, College of Science and Technology, **Manchester.** 2 p.m.

Tuesday, 21st March 1961

HUDDERSFIELD SECTION. *Fibre Identification—a lecture demonstration.* F. W. Lindley, Esq., Ph.D. and C. Beaumont, Esq., B.Sc., A.R.I.C., A.T.I., A.S.D.C. (Courtaulds Ltd.). Silvios Cafe, **Huddersfield.** 7.30 p.m.

Thursday, 23rd March 1961

MIDLANDS SECTION. *The Dyeing of Blends for Use in Carpets.* R. C. Cheetham, Esq., A.M.C.T., F.R.I.C., F.S.D.C., (Courtaulds Ltd.). Carpet Trades Ltd., Canteen, **Kidderminster.** 7 p.m.

WEST OF ENGLAND AND SOUTH WALES SECTION. *Technical Service in the Dyestuffs Industry.* F. North, Esq., B.Sc. (Imperial Chemical Industries Ltd.). The Pillar Room, Mauretania, **Bristol.** 6.30 p.m.

WEST RIDING SECTION. Annual General Meeting. Followed by *Four Decades with Dicot.* A. J. Wesson, Esq. (Furzebrook Knitting Co. Ltd.). The Victoria Hotel, Bridge Street, **Bradford.** 7.30 p.m.

Friday, 24th March 1961

LONDON SECTION. Annual General Meeting and Dinner. *An Introduction to Ion Exchange, colour and sound film produced by the Permutit Co. Ltd.* will be shown. Waldorf Hotel, Aldwych, **London W.C.2.** 6.30 p.m. for 7 p.m.

Tuesday, 28th March 1961

SCOTTISH SECTION. Ladies Evening. *Fashion and Mistress Brown, 1780–1880.* R. A. Peel, Esq., F.S.D.C. (Subject will be women's clothes, the colours and dyes, the influence of events—French Revolution, Chartist Movement, Queen Victoria, Mauve and Magenta (i.e. "Coal-Tar" dyes), Church of Scotland, Episcopal Church, etc.—upon the dress of Scotswomen). St. Enoch Hotel, **Glasgow.** 7.15 p.m.

Tuesday, 11th April 1961

SCOTTISH SECTION. Annual General Meeting. 7 p.m. Followed by *An Instrumental Approach to Colour Matching.* R. Sinclair, Esq., B.Sc., A.S.D.C. at 7.30 p.m. St. Enoch Hotel, **Glasgow.**

Thursday, 13th April 1961

MIDLANDS SECTION. Annual General Meeting. *Calculations of Fading Rates of Dyes of Different Lightfastness on Exposure to Fluorescent Tubes.* S. M. Jaekel, Esq., B.Sc., A.R.C.S., A.R.I.C. and C. D. Ward, Esq., B.Sc. *Effect of Dry Heat Treatment on the Dye Uptake of Nylon.* S. M. Jaekel, Esq., and D. A. Hampton, Esq., B.Sc. King's Head, **Loughborough.** 7 p.m.

Tuesday, 18th April 1961

HUDDERSFIELD SECTION. Annual General Meeting. *The Identification of Dyes in Substance and on the Fibre.* G. W. Midgellow, Esq., B.Sc. (Imperial Chemical Industries Ltd.). (Joint meeting with the Huddersfield Section of the Royal Institute of Chemistry.) Silvios Cafe, **Huddersfield.** 7.30 p.m.

Thursday, 20th April 1961

MANCHESTER SECTION. Annual General Meeting. *Factors Affecting the Efficiency of the Washing Process.* G. J. Parish, Esq., B.Sc., A.Inst.P. (British Cotton Industry Research Association). Lecture Theatre, Manchester Literary and Philosophical Society, 36 George Street, **Manchester 1.** 7 p.m.

Friday, 20th October 1961

LONDON SECTION. The Ninth London Lecture will be held at the Waldorf Hotel, **London W.C.2.** 7 p.m. Details later.

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NOTICE TO MEMBERS AND SUBSCRIBERS

Readers requiring *general information* regarding the Official Notices, List of Officers of the Society, etc., should consult pages 1-10 of the January 1960 and pages 389-396 of the July 1960 issues of the *Journal*, or write to *The General Secretary*, The Society of Dyers and Colourists, Dean House, 19 Piccadilly, Bradford 1, Yorkshire (Telephone Bradford 25138). *Editorial Communications* should be addressed to *The Editor*, at the same address.

Forthcoming Papers

The following papers have been accepted by the Publications Committee, and will appear in future issues of the *Journal*—

LECTURE

Dyeing and Printing Polyester and Polyester-Cellulosic Fabrics with
Polyestren Dyes

H. Musshoff

COMMUNICATIONS

The Adsorption of Non-ionic Dyes by Cellulose

J. R. Aspland and C. L. Bird

The Dyeing of Cellulose Acetate with Disperse Dyes
X— Saturation Values with Mixtures of Dyes

C. L. Bird and P. Rhyner

Rates of Adsorption of Sulphuric Acid on Wool in Presence of
Surface-active Agents

N. Buchsbaum and A. Datyner

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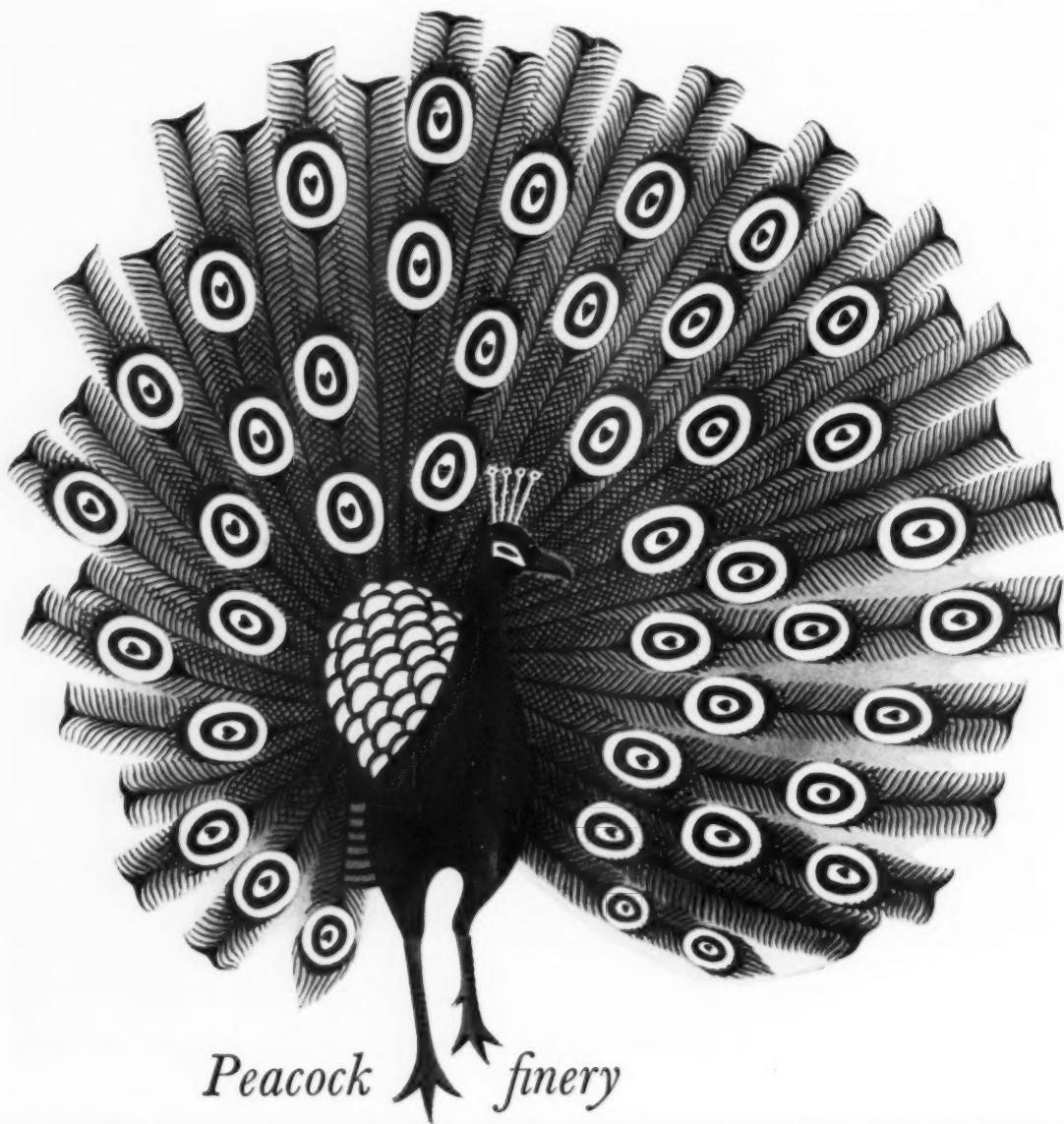
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THE JOURNAL

OF THE

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Examination for the Associateship (A.S.D.C.) 1960

The seventh examination for the Associateship of the Society of Dyers and Colourists was held in June 1960. The question papers and the report of the Examinations Board are set out below. It is hoped that their publication will prove helpful both to prospective candidates and to teachers and will inform members of the Society and others of the standard of knowledge expected from candidates for the Associateship.

Examination Papers

Papers A and B are taken by all candidates; Papers C, D, and E are taken by a candidate only in his chosen branch of tinctorial technology. Further, in Paper E a candidate has a choice of subject—analytical and testing techniques or the organisation of production and economics.

Paper A

General Chemistry and Properties of Dyes, Pigments, Auxiliary Products

General Chemistry and Properties of Organic High Polymers

10 a.m.–1 p.m. on Thursday, 16th June 1960

(SIX questions only to be attempted, three from each section of the paper)

SECTION I

1. Give an account of recent advances in knowledge of the mechanism of diazotisation.

2. Describe briefly the most important methods for preparing the sodium salts of the sulphuric esters of leuco vat dyes. Discuss the oxidation of these esters to the parent vat dyes.

3. In what way do neutral dyeing pre-metallised dyes for wool differ in structure from those requiring a strongly acidic dye bath? Give examples of each type and explain how such differences account for their different dyeing behaviour.

4. Write an account of the means whereby the phthalocyanine nucleus may be incorporated in dyes of different application classes. Explain the significance of any chemical changes which are brought about during application.

5. Give one example of each of the different types of colouring matter which contain azo groups. Indicate how each selected example may be prepared and show briefly how the dyeing properties of each are related to molecular structure.

6. Compound A has the molecular formula $C_{14}H_9O_2N$ and yields a diazo compound on treatment with nitrous acid. When A is fused with potassium hydroxide at $230^\circ C$. and the fusion mixture diluted with water and aerated, a precipitate B ($C_{28}H_{14}O_4N_2$) is obtained which does not yield a diazo compound with nitrous acid. On oxidation with hypochlorite B yields a product C ($C_{28}H_{12}O_4N_2$) which can be reconverted to B by reduction. Reduction of B with sodium hydro-sulphite and caustic soda yields a soluble sodium salt D ($C_{28}H_{14}O_4N_2Na_2$), whereas reduction of B with zinc dust yields E ($C_{28}H_{18}O_4N_2$). D and E can both be oxidised to B.

Write equations for these reactions and identify each compound. For what purpose is compound B used?

7. Describe the preparation of (a) an anionic, (b) a cationic, and (c) a non-ionic surface active agent from a natural fat. (Ordinary soap is excluded.)

8. What methods are used for the manufacture of sulphur dyes and what are the most important classes of intermediates from which these dyes are made? What do you know about the structural features of sulphur dyes.

SECTION II

9. (a) Discuss the assumption, which is normally made, that the termination constant in vinyl polymerisation is independent of the chain-length. What is the purpose of the assumption?

(b) In the polymerisation of methyl methacrylate, catalysed by benzoyl peroxide, it was found that the initial rate of polymerisation was proportional to the square root of the catalyst concentration. Show what assumptions about the mechanism of the polymerisation process may be supported by this finding.

10. The heat of melting of crystallites of linear polyethylene is 66.2 cal/g., and their entropy of melting is 0.162 cal/g.^oC. Derive a formula for calculating the melting point of linear polyethylene from these data, and carry out the calculation. Briefly discuss the significance of your result in relation to the known melting point of high-pressure polyethylene (115^oC.).

11. Write a short essay on **one** of the following topics—

- The technical importance of raw material purity in polymer production
- Molecular weight measurements
- The glassy state.

12. Write brief explanatory notes on **four** of the following—

- Chain conformation
- Ceiling temperature in vinyl polymerisation
- Ideal copolymerisation
- Degree of crystallinity
- Syndiotacticity
- Polycondensation reactions.

13. Describe the structures of the principal commercial fibre-forming polymers containing nitrogen.

Paper B

Theories of Colour Relation of Colour to Constitution Colour Assessment and Colour Fastness

2-5 p.m. on Thursday, 16th June 1960

(FIVE questions only to be attempted)

1. Define and briefly describe any **three** of the following terms—

- Spectrum Locus
- Illuminant A
- Isobestic Point
- Abridged Spectrophotometer
- Specular Reflectance
- After Image.

2. You are in charge of colour matching in the laboratory of a firm specialising in dyeing woollens, and have about £600 to spend on an optical instrument. Would you purchase a spectrophotometer or a photoelectric filter colorimeter? State the reasons for your choice.

3. (a) Describe Maxwell's Disc used as a means of mixing colours additively.

(b) A black disc is provided with three coloured sectors the areas of which are variable. The C.I.E. colour specifications under Illuminant C of the sectors are as shown in Table I.

TABLE I

	Red Sector	Green Sector	Blue Sector	Black Disc	Pattern A	Pattern B
X	51.5	20.9	18.6	10.3	34.4	24.1
Y	32.0	40.0	35.2	10.5	35.0	24.5
Z	22.4	32.6	87.3	12.4	41.4	29.0

(Illuminant C $x = 0.310$, $y = 0.316$)

Calculate the fractional areas which would be covered by each sector in colour matching Pattern A. (Only coloured sectors are needed for this match.)

Having satisfactorily matched Pattern A, describe how you would set about matching Pattern B.

4. (a) State and prove Lambert's Law of absorption as it applies to a dye solution.

(b) How can your proof be extended to establish the Beer-Lambert Law?

(c) You are presented with aqueous suspensions of two vat dyes which are known to be chemically identical but to differ in particle size distribution. How would you determine the relative concentrations of the two dyes?

5. Write an essay on one of the following subjects—

- The use of spectrophotometry in the identification and quantitative analysis of soluble dyes.
- The C.I.E. system of colour specification.
- Instrumental colour matching.

6. Discuss the structure and resonance possibilities of the triphenylmethane dyes. Account for the fact that the colour of the dye Crystal Violet changes from purple to green and then to yellow in a solution of decreasing pH.

7. It is required to colour a drab green pattern with a mixture of a bright yellow, a bright blue, and a black dye. Describe the difficulties which might be encountered. Discuss the value of a G.E. Recording Spectrophotometer in carrying out this task.

8. When colouring plastics with pigments it is found that the purest colours are generally obtained by a mixture of coloured and white pigments. Explain the reason for this effect, and why the addition of a white pigment is not necessary to obtain maximum purity with certain colours.

9. A mixture has been analysed qualitatively and is known to contain dyes A and B. Quantitative analysis is attempted by absorptiometry in water and in pyridine, respectively. The absorption spectra of the pure components are not affected by change of solvent; but the mixture changes as shown in Table II. Determine the composition of the mixture from the data given, and define the colours of A and B.

TABLE II

Wavelength (m μ .)	Optical Density in 1 cm. cell Concentration 1 g./litre			
	Dye A	Dye B	Mixture in Water	Mixture in Pyridine
400	0.532	0.011	0.352	0.354
440	1.091	0.001	0.710	0.708
480	1.125	0.101	0.787	0.875
520	0.545	0.495	0.632	0.528
560	0.241	1.033	0.715	0.625
600	0.128	0.872	0.554	0.710
640	0.095	0.497	0.330	0.422
680	0.183	0.241	0.249	0.175

BRANCH 1—TINCTORIAL TECHNOLOGY AS APPLIED TO TEXTILES

Paper C

Properties of the Materials and Finished Products and Fundamental Mechanisms of the Industrial Processes

10 a.m.—1 p.m. on Friday, 17th June 1960

(SIX questions only to be attempted)

1. Dye manufacturers often quote an "optimum temperature" for a direct dye, i.e. the temperature at which the dye shows maximum exhaustion after dyeing for one hour. Discuss the fundamental significance of "optimum temperature".

2. Discuss the relationship embodied in the following equation—

$$\Delta\mu^\circ = \Delta H^\circ - T\Delta S^\circ$$

in its application to dyeing theory.

3. Vat dyes are divided into several dyeing classes. Define these classes and explain the reasons for using different temperatures and different amounts of electrolyte.

4. Write an essay on the control of pH when dyeing wool with acid dyes which do not level well.

5. Outline the methods available for stripping dyes from textile materials, and indicate the principles which underlie each method.

6. What methods are used to improve the wet fastness of direct cotton dyeings? Outline the basic chemistry of each method.

7. What are considered to be the merits and de-merits of reactive dyes in the production of a fast-coloured printing style? Compare these dyes with vat dyes and resin-bonded pigments.

8. Discuss the effect of organic solvents on the absorption of dyes from aqueous solutions by wool and nylon, respectively.

9. Give an account of the fundamental properties of a vat dye which determine its suitability for printing cellulosic fibres.

10. Outline the chemistry of thermosetting resins applied to produce conventional "Crease Resist", or "Minimum Iron" finishes. Define the principles underlying the production of fabrics having good wet and dry crease recovery.

11. Outline the principles on which the various processes for reducing the felting power of wool are based. Discuss the influence of these treatments on the dyeing behaviour of the fibre.

12. Trace the development of the application of dyes to polyamide fibres.

Paper D

Industrial Procedures and Plant

2–5 p.m. on Friday, 17th June 1960

(SIX questions only to be attempted)

1. Compare single- and double-stick hank dyeing machines and discuss in detail the advantages or disadvantages of the double-stick principle.

2. Write an essay on **one** of the following subjects—(a) shrink-resist finishes for all-wool knitwear, (b) package dyeing.

3. Describe methods for the preparation and dyeing of **two** of the following—(a) bulked-nylon muffers, (b) fully-fashioned acrylic jumpers, (c) all-wool Jersey fabric, (d) wool-nylon half hose.

4. Describe how you would prepare, bleach, dye to pastel colours, and finish, **two** of the following—(a) bulked-nylon socks, (b) all-wool knitted pram sets, (c) cotton interlock fabric.

5. Discuss the advantages and disadvantages of the Vigoureux printing process for wool slubbing, as compared with slubbing dyeing and blending, for the production of mixture effect yarns.

6. Describe with sketches a friction calender. Starting with a printed cotton cambric, give an outline of the sequence of operations in the production of a permanently glazed dress cloth.

7. Write a critical appraisal of pad-steam, pad-batch, and pad-jig methods for applying reactive dyes to viscose rayon fabrics.

8. Make a simple sketch of the Standfast molten metal machine. Compare dyeing by this method with jig dyeing for cotton poplin shirtings and state also the types of dyes and fabrics for which the Standfast machine is best suited.

9. Describe the Flash Ageing process and discuss the advantages claimed for it in comparison with other steaming processes. What are its disadvantages?

10. Describe briefly, and discuss the use of, each of the following—(a) Mather kier, (b) decatizing machine, (c) milling machine.

11. Describe a plant for the continuous bleaching of cotton pieces with hydrogen peroxide.

12. Name the class of dye you would select for producing a dyeing of—(a) royal blue on cotton yarn in hank form to be used as a woven effect thread in handkerchiefs, (b) pale pink on knitting wool, (c) grey on viscose satin lining, (d) a typical dress colour on secondary acetate poult fabric. Describe fully the dyeing procedure for one of them.

13. Discuss the increasing use of pigment-printing methods. What disadvantages are there compared with the use of styles which produce comparable effects with fast dyes?

14. Write an account of **one** of the following—
(a) discharge styles, (b) printing with phthalocyanine dyes.

Paper E

10 a.m.–1 p.m. on Saturday, 18th June 1960

(Either Paper (i) or Paper (ii) to be attempted)

(i) Analytical and Testing Techniques

(FIVE questions only to be attempted)

Answer Q.1 Part (a) or (b) and four other questions.

1 (a) Explain the action of an acid-base indicator.

The dissociation constant of acetic acid at 18°C. is 1.85×10^{-5} . What is the pH of a 0.04 N. solution of acetic acid at this temperature?

or (b) Describe Kjeldahl's method for determining nitrogen.

During a Kjeldahl determination the ammonia from 1.101 g. air-dry resin-treated fabric is passed into 50 ml. of 0.0990 N. sulphuric acid. The residual acid is just neutralised by 28.3 ml. of 0.106 N. sodium hydroxide. The moisture content of the fabric is 13.2%. Calculate the percentage nitrogen in the oven-dry fabric. (Atomic weight of nitrogen = 14.0.)

2. What tests should be carried out to determine whether a dyed cotton fabric is suitable for rubber proofing? Give the essential details of one quantitative determination considered necessary.

3. Give details of—

- The preparation and calibration of a density-gradient tube
- The detection of mildew on textile materials
- The use of diazotised sulphanilic acid to determine the extent of damage in wool fabrics.

4. Write a short essay on the duties of the analyst in relation to dyehouse water supply and effluent disposal.

5. Describe two methods for determining the flammability of textiles. What pretreatments may be necessary before performing the tests and how are the results expressed?

6. A fabric is said to consist of a nylon-cotton blend backed with polyvinyl chloride. Describe tests which would confirm this. Give the details of a method for determining the amount of each fibre present.

7. Describe one method for the quantitative determination of any **two** of the following—

- Residual acid in a sample of dyed wool
- Mothproofing agent on a wool carpet
- Residual sulphur dioxide in bleached wool.

8. Discuss the use of Grey Scales in colour fastness testing. Describe the ISO Recommended test for Colour Fastness to Mercerising.

9. Describe the methods of determining the fluidity of cotton, silk, and nylon respectively. State what result would be obtained in each case using normal material.

10. Give an historical account of the development of methods for assessing the fastness to light of dyed textile materials.

11. Outline the uses of (a) ultraviolet radiation and (b) the polarising microscope in the detection of faults and assessment of damage in textiles.

12. Discuss microchemical methods for detecting metals in the ash from textile materials.

(ii) Organisation of Production and Economics

FIVE questions only to be attempted

N.B.—The terms *finishing works* or *dyeworks* cover all firms engaged in the bleaching, dyeing, and printing of textiles)

1. One simple definition of the term "manager" is "a person who is responsible or accountable for the work of others". Discuss the managerial rôle of a head dyer or chief colourist, describing the duties and usual scope of responsibilities attached to the position.

2. Discuss the term "good organisation" and indicate a typical dyeworks organisational structure.

3. Discuss production planning and production control. Outline such a system applied to a finishing works.

4. What do you understand by "Work Study"?

5. Explain the principal reasons for cost accounts. Describe a typical system.

6. The problem of mending, cobbling or repairing cloth or yarn always exists. What are the best ways of controlling and minimising it.

7. Write notes on **one** of the following—

- Accident prevention
- Materials handling
- Industrial welfare.

8. Explain and discuss two wage incentive systems.

9. Discuss the function of the merchant converter.

10. The recent scheme for the rationalisation of the cotton industry has been described as "the euthanasia of an obsolescent industry". Discuss and comment on this statement.

11. The stock control and handling of dyewares and chemicals in some dyeworks are, in the opinion of one critic, out of date. Comment on this and outline modern methods designed for greater efficiency.

BRANCH 9—PRODUCTION OF DYES, LAKES AND PIGMENTS

Paper C

Properties of the Materials and Finished Products and Fundamental Mechanisms of the Industrial Processes

10 a.m.–1 p.m. on Friday, 17th June 1960

(FIVE questions only to be attempted)

1. What are the main structural features necessary in a dye molecule for it to be a direct cotton dye? Illustrate your answer with examples of dyes and structural formulae. What general conclusions can be drawn as to the structural features required for this type of dye?

2. "A most striking, recent advance in dye chemistry is the advent of the dyes which react chemically with the fibre." Comment on and elaborate upon this statement with respect to two different types of reactive system.

3. Outline recent advances in our knowledge of the mechanism of either (a) diazotisation or (b) coupling.

4. Give the main methods for the conversion of phthalic anhydride into four different types of chemical structure which are used as dyes or pigments.

5. What types of azo compound can be converted into metal-complex dyes? Outline the different methods for the introduction of the metal atom into the dye molecule. In what way are the properties of azo dyes of this type affected by metallisation?

6. Great importance is attached to the production of a pigment in the correct physical form. Discuss this statement in relation to the phthalocyanine pigments.

7. Write an essay on: Inorganic Pigments—Their Properties and Uses.

8. Give the constitution of three compounds which can be utilised as a yellow, a red, and a blue pigment respectively. Compare the properties of these compounds with those of other pigments of the same colour. Give a detailed method for the preparation of any one of the pigments you cite.

9. Describe (a) the methods available for the preparation of stabilised diazonium compounds used for the production of azoic dyes and (b) how yellow and green azoic dyes may be obtained.

10. By what methods may any two of the following compounds be prepared—Indanthrone, Flavanthrone, Pyranthrone, or Caledon Jade Green (16,17-dimethoxyviolanthrone)? Comment on the importance of these compounds as dyes.

Paper D

Industrial Procedures and Plant

2–5 p.m. on Friday, 17th June 1960

(FIVE questions only to be attempted, two from Section I and three from Section II)

SECTION I

1. What are the B.I.O.S. and F.I.A.T. reports? State when and how they were obtained and what benefit you consider they have been to pigment and lake manufacturers in other countries.

2. Describe briefly the manufacture of either Bismarck Brown or Chrysoidine. How would you prepare an insoluble lake from the dye selected?

3. Discuss the constitution, general properties and usage of phthalocyanine dyes and pigments.

4. How would you prepare precipitated barium sulphate free from soluble salts and how does this differ from barytes?

SECTION II

1. Sketch and describe a suitable plant for the manufacture of the alumina-barium lake of an Acid Scarlet dye for use as a paper coating. How would you test the lake for cover and strength?

2. In preparing the red pigment from meta-nitroparatoluidine and beta naphthol what steps would you take to ensure that the final product was free from (a) insoluble impurities such as wood and metal, and (b) soluble salts?

3. Name four important inorganic pigments, give their chemical constitution and method of manufacture.

4. Describe a suitable machine for the grinding of an organic dye or pigment. How would you test the efficiency of grinding for each batch?

5. How would you prepare the inorganic pigment Chrome Yellow? Sketch a suitable plant for its manufacture.

6. Describe the preparation of two lakes based on 3,2-hydroxynaphthoic acid.

Paper E (ii)

Organisation of Production and Economics

10 a.m.–1 p.m. on Saturday, 18th June 1960

(FIVE questions only to be attempted)

1. Give a typical establishment list for a medium sized factory producing dyes, lakes and pigments, and outline the responsibilities at each level.

2. Give an account of the organisation necessary for the control of quality in a colour manufacturing unit.

3. Describe a costing system applicable to a dye or lake making factory.

4. Outline schemes for—
 (a) job evaluation
 and
 (b) merit rating,
 and describe how you would introduce them into a dyestuff factory employing up to 500 operatives.
5. Sketch a plan of what you consider to be an ideal lay-out for a medium sized factory designed to produce dyes, lakes and pigments.
6. Discuss the qualities you would look for when choosing a chargehand or foreman, and detail the responsibilities of the latter.

7. Write notes on **two** of the following—
 (a) Plant maintenance
 (b) Accident prevention
 (c) Materials handling.
8. Describe the constitution and function of a works committee.
9. "Engineering is a service." Discuss this statement in relation to the manufacture of dyes and pigments, with particular reference to its effect on the economy of production.

Report of the Examinations Board

The 1960 Examination was held on 16th, 17th and 18th June 1960 in London, Belfast, Bradford, Manchester, Nottingham, Paisley and Beirut, Lebanon. Subsequent interviews were held in Bradford on 20th September and 7th October, and in Manchester on 8th October.

There were 63 candidates, 16 more than in 1959. It is doubtful whether this increase will continue; indeed, because of the fall off in recruits for the textile dyeing and printing industries it may be that future years will show a decrease in the number taking the examination.

Of the 15 candidates who took Papers A and B only, only 4 satisfied the examiners; and of the 2 who took Papers A, B and C only, one satisfied the examiners. The proportion of failures was far too high and the replies submitted by those who failed showed only too clearly that in most cases preparation for the examination had been inadequate. One candidate attributed his poor showing to his inability to attend classes because he was on night work and had confined his preparation to reading the *Journal*. He showed lack of initiative in not reading the standard textbooks and in not obtaining advice on what to read. Candidates in such a position will find that the responsible persons in teaching institutions will readily advise them on a course of home reading and will be prepared to set and comment on essays.

Sixteen candidates took papers to complete the examination and 11 satisfied the examiners. Of the five who failed, four did so because of weakness displayed in answering Papers A, B and C.

Thirty candidates took the examination as a whole and 11 satisfied the examiners. Here again, lack of basic knowledge was the chief cause of the 19 failures, for only five of them failed in papers other than A, B or C.

This failure of so many candidates to prepare adequately for the examination is a matter for concern, more especially because, as is shown in the following table, the majority of failures were in

Paper	Number of Candidates	Failures
A	49	{ 24 in Section (i) 21 in Section (ii)
B	49	
C	42	5
D	41	3
E(i)	23	3
E(ii)	17	3

Papers A and B, for which systematic preparation is essential.

Nearly one third of those who took Papers A and B returned extremely poor answers to the questions; on the other hand, almost as many gave very good answers.

In a few cases the results of the written examination were not a true indication of the calibre of the candidate, as bad timing resulted in insufficient time being devoted to some of the questions. Candidates should bear in mind the importance of allocating sufficient time to each question. There is no doubt that some candidates would have benefited by some instruction in the approach to examinations and in answering examination questions.

The examiners again remark on the generally low standard of written English displayed by the candidates. Prospective candidates would do well to bear in mind one examiner's comment that he remembers with gratitude Mr. Fred Scholefield's advice— "Words are the tools of thought; cultivate a full vocabulary and you will be able to think and express yourself better."

The interviewing of candidates, which, it is emphasised, is as much a part of the examination as the written papers, has again proved its value, not only as a means of assessing the quality of individual candidates, but also as a guide for future policy.

As a result of the written examination and interviews of the 36 candidates who completed the examination, the Board recommends the 22 candidates whose names are given in the Appendix* for election as Associates.

The following detailed comments by the examiners are given as a guide for prospective candidates and for those responsible for their training. For Papers C, D, and E(ii), only the comments of the Branch 1 examiners are given, as there was only one candidate in Branch 9.

Paper A

SECTION I

A slightly lower standard was shown than in previous years. Question 6 was the best answered, there being only one failure among the 15 candidates who took it. It is unfortunate that more candidates did not attempt this question, but they seem to have shown the usual reluctance to attempt a problem.

* See page 682.

Questions 1 and 2 were the worst answered; they were the two questions least likely to be covered in lecture courses, but both have formed the subject of fairly recent papers in the *Journal*. Question 1 in particular was completely covered in the Griess Symposium. Wider reading by candidates would seem to be necessary. Question 5 was the most popular, and of the 39 candidates who attempted it only 9 failed and most returned good to very good replies, one being excellent. The remaining questions reflected the overall performance, about half of the replies being satisfactory. There was a tendency, particularly in Question 7, for candidates not to read the question carefully and consequently to return an answer which was not an answer to the question asked.

SECTION II

Questions 11, 12 and 13 were by far the most popular. Only 5 candidates attempted Question 9 and all returned very poor answers, whereas the two who attempted Question 10 gave very good answers. As in Section I, 5 candidates showed clearly that they lacked all knowledge of the questions they attempted. Question 11 was attempted by all but one of those taking the paper and a few gave excellent replies. Question 12 troubled most of the 40 candidates who attempted it and only one in four returned satisfactory answers, though 3 candidates gave very good ones. Question 13, attempted by 38 candidates, was well answered by the majority, most of whom gave good to very good replies, while 3 were excellent.

Paper B

There was the usual spread of marks with one excellent and four very good sets of replies. Question 1 was well answered, but Question 2 showed that many candidates were ignorant of recent applications of photoelectric instruments. To Questions 3 and 9 (calculations) there were some excellent answers, but most candidates tended to rush into calculation without thorough reading of the question. Question 4 revealed that every candidate now knows the Beer-Lambert Law, but only about 10% know how to prove it mathematically. As the logarithmic law of light absorption is of considerable importance in colour physics, this lack of knowledge is unsatisfactory. Questions 5, 6 and 7 were adequately answered. Question 8 was poorly answered by the 6 candidates who attempted it.

Paper C

Only 3 of the 25 candidates who attempted Question 1 returned satisfactory answers. The candidates did not appreciate that "optimum temperature" is an indirect measure of rate of dyeing. Question 2 was generally satisfactorily answered by the 9 candidates who attempted it. Thirteen candidates attempted Question 3. Their answers ranged from very good to very poor. The answers of the 25 candidates who attempted Question 4 were generally satisfactory, but none was outstanding. The replies to Question 5 attempted by 31 candidates showed that one group of candidates appeared to have no knowledge about methods of stripping dyes from wool. Question 6 was fairly well answered by 34 candidates, although only two of them mentioned coupling with diazotised *p*-nitroaniline. All 16 candidates who attempted Question 7 gave good to very good answers. To Question 8, taken by 17 candidates, satisfactory to very good answers were returned. Not a single good answer to Question 9 was returned by the 16 candidates who took it. Redox potential is not the only factor affecting the suitability of a vat dye for printing cellulose fibres. One excellent and two very good replies were made to Question 10, the remaining 12 being satisfactory to good. Question 11 was taken by 22 candidates, most of whom returned satisfactory to very good replies, only two being poor. The replies to Question 12, taken by 27 candidates, ranged from very poor (2) to very good (9).

Paper D

Thirty-seven of the 40 candidates who took this paper were able to satisfy requirements, although it cannot fairly be said that more than a few were of high calibre. For the most part the answers were adequate to rate a pass, but very rarely did an inspired description of a process or machine turn up to make the examiner sit up and think this was exactly what he was looking for.

Sketches were almost invariably badly drawn and, generally speaking, presentation was bad. Most candidates did not "sell themselves" on paper and probably an occasional lecture by teachers of this subject on how to present an answer to a question would be a good thing.

QUESTION 1 (attempted by 17 candidates)—The candidates did not in general appreciate the importance of liquor flow and none mentioned turbulent or smooth flow conditions. It would appear that their lectures did not deal with the mechanical principles of the various types of dyeing machines and information they have picked up themselves is rather sketchy. Several candidates believed that in single-stick machines only downward circulation is possible, as upward circulation would lift the yarn off the sticks!

QUESTION 2 (32)—The knowledge of shrink-resistant finishes displayed was not sufficiently up to date. Sulphur stoving used for non-shrink treatment and "unshrinking treatment" shows poor understanding of terminology. Several candidates used melamine as a softening agent.

QUESTION 3 (13)—Fairly well answered. Great imagination was used and lots of softening agents.

QUESTION 4 (19)—Some candidates believed that all wool knitted pram sets are made from heavily milled woven material!

A number of candidates believed cotton interlock to be a woven material which requires desizing before bleaching. Bleaching treatments described were generally over-severe, and acid sour treatments were used with abandon. One candidate bleached the interlock fabric with sodium hypochlorite at the boil!

QUESTION 5—Only 8 candidates attempted this question; the advantages of *mélange* were not fully realised.

QUESTION 6—This question, rather surprisingly, was answered by only 8 candidates, of whom all but one gave a good showing. In a country flooded with printed polished cottons, one would expect more candidates to be ready to write knowledgeably on the subject.

QUESTION 7 (15)—With two exceptions, answered reasonably well. The advantages of a process which is suited to the production of *small* runs did not seem to be appreciated as it should be in a country which has a finishing industry dependent for so much of its work on short-running styles.

QUESTION 8 (30)—The general level of answers was good. Most candidates omitted to mention the external storage and mixing dye tanks which form such an important feature of this machine, and if a number of candidates are to be believed it is impossible to dye cloth on a jig without getting it listed.

QUESTION 9—Answered by 12 candidates, all of whom showed a good knowledge of the process.

QUESTION 10 (21)—The answers were passably good, but would have been so much better with decent sketches. One candidate would use caustic soda and hypochlorite in a Mather kier.

QUESTION 11—Only seven candidates attempted this question, which is surprising in view of the great amount of publicity given to this subject.

QUESTION 12 (38)—Attempted by all but 2 of the candidates. Very well answered without a failure. It was most encouraging to see that the watering of poultis was stressed so much, and it would appear that a recent paper in the *Journal* on this important topic has found its mark.

QUESTION 13 (11)—Answered reasonably well. The rather unexpected statement that the introduction of the automatic screen-printing machine is responsible for the increasing use of pigment colours should interest the manufacturers of these.

QUESTION 14 (8)—All except one gave very good replies.

Paper E(i)

QUESTION 1—Of the 23 candidates who took this question, only 6 returned satisfactory replies, but of these one was excellent and two very good. Over half the replies were very poor.

QUESTION 2 was attempted by only two candidates who returned an excellent and a poor answer, respectively.

QUESTION 3 was taken by five candidates, of whom one gave a satisfactory and four good to very good replies.

QUESTION 4 was generally well answered by the 11 candidates who attempted it, one excellent and one poor reply being outstanding.

QUESTION 5 was attempted by 7 candidates, who returned two excellent, three very good, one poor and one very bad reply.

QUESTION 6 was answered by 17 candidates and QUESTION 7 by 8 candidates, all of whom gave very good to excellent replies.

QUESTION 8, attempted by 10 candidates, received mostly good to very good replies, one being excellent, while two were unsatisfactory.

QUESTION 9—Of the 15 candidates who answered this question only one failed, the other answers being good to very good, one being outstandingly good.

QUESTION 10 was well answered by the 9 candidates attempting it.

QUESTION 11 was not attempted by any candidate.

QUESTION 12—One good, two borderline and two poor answers were given by the five candidates who attempted it.

Paper E(ii)

The increase in the proportion of candidates taking this paper is most welcome and it is hoped that it will continue. The interviews revealed that some candidates better fitted to take this paper had taken Paper E(i) because more stress had been laid on preparation for Paper E(i) rather than for E(ii) in their academic training and because of failure to realise that the real preparation for this paper is by careful observation and consideration of the organisation of the works in which they are employed. Most of the 16 candidates who took this paper answered the questions reasonably well, there being four very good papers and no poor one, the three failures being attributable to insufficient experience and, in one case, to lack of exactitude.

It is most gratifying to see that the high standard demanded of successful candidates for the Associateship of the Society was attained by a substantial proportion of the examinees, and that the Society's examinations are having a beneficial influence on training for the tinctorial industries. Finally, it may be of value to reiterate the main lessons of this year's examinations, namely, that more attention must be paid to acquiring basic knowledge, particularly that needed for Papers A and B, and that every effort should be made to dissuade students from entering for the examination until it is certain that they are adequately prepared to display the high standard of knowledge and skill required if they are to be successful.

C. O. CLARK (*Chairman*)

R. L. ELLIOTT
W. PENN
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J. V. SUMMERSGILL
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Proceedings of the Society

Dyeing and Finishing Fabrics containing Tricel Triacetate Fibre

R. J. MANN

*Meeting of the Northern Ireland Section held in the Grosvenor Rooms, Belfast, on 8th March 1960.
Mr. W. J. Watts in the chair*

The salient properties of Tricel, as they affect the dyer and finisher, are reviewed and processes for the treatment of knitted and woven fabrics are described.

INTRODUCTION

Cellulose triacetate is somewhat farther removed than is the secondary acetate, with which we have been familiar for about half a century, from their common parent, cellulose. In secondary cellulose acetate fibres, approximately two-thirds of the available hydroxyl groups of cellulose are replaced by acetyl groups, with consequent reduction in hydrophilic properties. With the substantially complete replacement of the hydroxyl groups in triacetate, the fibre becomes even less hydrophilic.

From the point of view of the dyer, an even more important property, since it very largely decides the treatment that can be applied, is thermoplasticity in the wet state. The relation of the thermoplastic properties of Tricel* in the wet state to those of Dicot† is shown in Fig. 1.

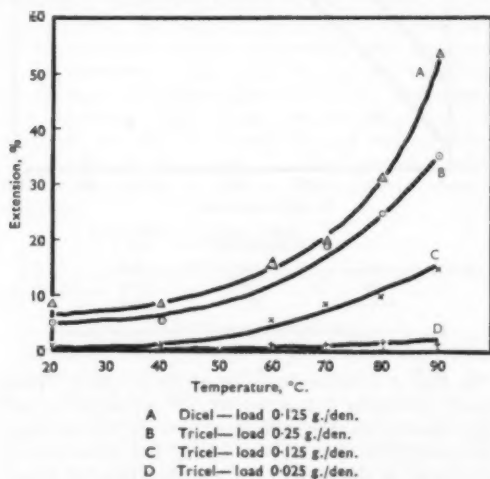


FIG. 1—Wet thermoplasticity of Tricel and Dicot

Measured lengths of yarn were suspended from clips and loaded with weights of up to 50 g. They were then immersed for 1 hr. in water at 20–90°C. After the yarns were removed from the water, the weights were replaced by 1 g. weights to maintain tautness and the yarns were allowed to dry in the open laboratory. The lengths of the dry yarns were then measured.

It is evident from Fig. 1 that the tendency of the fibre, or of a fabric made from it, to distort

under applied stresses when wet increases with temperature. It is also clear that, at a given temperature, Tricel shows considerably less tendency to distort than does Dicot. It follows that Tricel is likely to suffer less damage due to distorting forces, as in winch dyeing, than is Dicot, under identical conditions, but the processes must still be carefully controlled.

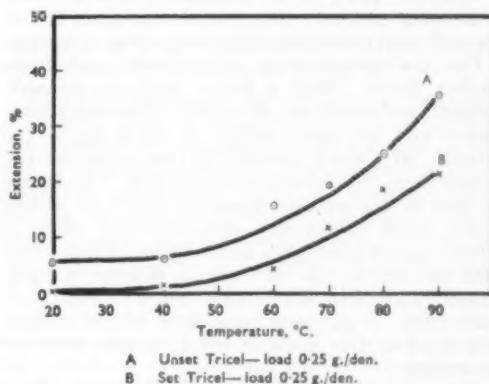


FIG. 2—Effect of setting on thermoplasticity of Tricel

In Fig. 2 the wet thermoplasticity of set Tricel is compared with that of the unset fibre. It is clear that setting, which is dealt with in detail below, reduces the sensitivity to deformation at high temperatures.

Operations Specific to Tricel

Before considering the treatment to be given to particular types of fabrics it will be useful to consider two operations—setting and saponification—which, although not specific to Tricel, require special consideration.

SETTING

The capacity for being set is the main characteristic in which Tricel differs from Dicot and resembles the synthetic fibres. In this case, however, a somewhat less drastic increase of internal orderliness is involved than occurs with nylon and polyester fibres. As a result of setting, the resistance of the fibre to dimensional change, particularly when wet, is enhanced. Consequently, a fabric which is set when flat becomes more resistant to creasing during laundering, whereas a fabric which is set in a creased condition (as in pleated goods) retains those creases.

* Registered trade mark of the cellulose triacetate fibre marketed by British Celanese Ltd.

† Registered trade mark of the secondary cellulose acetate fibre marketed by British Celanese Ltd.

All goods containing Tricel and having a sales appeal based on "minimum-iron" properties should therefore be set in open width; those that are to be pleated may or may not be set in the flat condition, but must certainly be set after pleating.

The process of setting has become familiar to dyers and finishers since its introduction in connection with the synthetic fibres. The only points needing elaboration are the precise conditions necessary for Tricel. Possible setting processes fall into three main groups—

(a) dry heat, (b) steam, (c) solvent setting.

Method (c), employing such compounds as diethylene glycol or diethylene glycol diacetate, is effective in producing some, at least, of the desirable effects of setting, but there are difficulties in application, and it is not easy to carry out on standard equipment.

Steam-setting

From the point of view of fabric properties, this is the ideal method. It produces minimum loss of strength and minimum reduction in rate of dyeing.

Consider an underwear locknit fabric made from 55-den. Tricel. Such a fabric would be relaxed, scoured, and steam-set on rollers in the damp condition and in open width, at 18 lb./sq.in. for 30 min., after which it would be dyed in the normal manner on the winch and dressed. A fabric treated in this manner should be stable to within $\pm 5\%$ both course-way and wale-way when a 50-cm. square is scoured in a solution of 2 g. soap/litre for 30 min. at 60°C. in a Hoover washer, rinsed, and drip-dried with wales vertical or horizontal. A garment made from it, and washed and dried in this manner, would require little or no ironing.

Unfortunately, this process is limited in application for the following reasons—

(a) It has not been found possible to carry out this form of setting without producing watering. This is extremely slight if the operation is carried out correctly; in pale depths, as used for underwear, it is unnoticeable. In fuller depths, however, it becomes apparent, and for the high-quality goods for which this fibre is used, steam-setting is impracticable commercially.

(b) Unlike most of the synthetic fibres, Tricel does not shrink during setting; on the contrary, the fibre tends to extend slightly. This introduces another difficulty when attempting to steam-set a thin, rigid fabric (e.g. a plain, continuous-filament woven fabric); gentle ripples may form in the warp direction. Although subsequent treatments can often be devised to remove these ripples temporarily, so effective is the setting treatment that they will almost certainly return.

Dry-heat Setting

The above difficulties may be avoided by dry-heat setting, the general principles of which are now familiar to most finishers, although each type of fibre requires its own conditions. The degree of setting produced is determined by the highest temperature attained by the fibres, which depends

on several factors, including fabric construction and duration of exposure to the source of heat.

In order to demonstrate this, it is necessary to have a means by which the degree of setting can be determined. The effect of setting on Tricel is conveniently determined by assessing the stiffening temperature of the fabric, not because rise in stiffening temperature is necessarily the most valuable change produced by setting, but because it is the most readily assessed and is indicative of other desirable modifications. Stiffening temperature is defined as the minimum temperature at which stiffening occurs when a hot plate giving a pressure of 0.6 lb./sq.in. is allowed to rest for 5 sec. on the fabric, which is supported on a $\frac{1}{2}$ -in. asbestos bed covered with four layers of cotton madapolam. This test is to some extent subjective, and it is desirable to obtain a mean value from a considerable number of assessments in order to obtain a reasonably accurate picture.

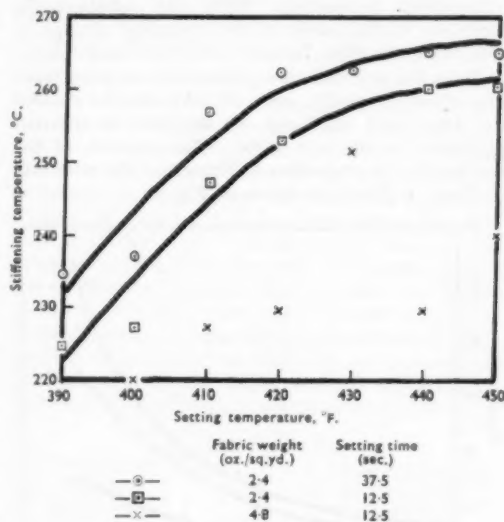


FIG. 3—Factors affecting degree of setting of Tricel

In Fig. 3 is shown the effect on a 100% Tricel fabric of weight 2.4 oz./sq.yd., of exposure to setting conditions for different periods at between 390 and 450°F. For a given fabric, the effectiveness of setting is dependent on the duration of treatment. Results obtained with a fabric weighing 4.8 oz./sq.yd. were too few to enable a curve to be drawn, but it is clear that heavier fabrics require a somewhat longer, or a rather hotter, setting treatment than lighter fabrics.

Dry-heat setting can be achieved either by means of hot air or through contact with a hot surface. In the former case, the temperature of one section of a stenter is increased, and in the latter the fabric passes in contact with hot bowls. The bowls may be open, as in the National Machine Company's apparatus, or may be covered by endless blankets which hold the fabric in contact with the bowls, as in the Bates Type K machine. These types are illustrated diagrammatically in Fig. 4.

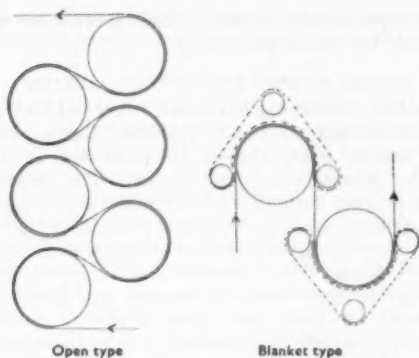


FIG. 4—Diagram of contact-setting apparatus

The bowls may be highly polished or, preferably, finely matted to minimise glazing.

Each method has its advantages. The stenter avoids all risk of glazing and loss of width, but fabric in contact with the pin plates is liable to be unset and to dye differently from the bulk, especially in full depths. The roller type of machine is more economical in space and costs less, but in the open type there is no means of controlling width and little control of length. These objections are less applicable to the blanket type of machine, but both roller types tend to give excessive glazing, especially on knitted fabric, which becomes highly compressed. Setting of material dyed with disperse dyes often results in appreciable improvement in wet fastness. This, and the fact that the less-set areas at the edges of the stenter-set pieces may dye unevenly after being set, usually make it desirable to dye the fabrics before setting when full depths are required. In this case, a further wet treatment is sometimes desirable to remove stiffening.

SAPONIFICATION

This is another operation with special significance for Tricel.

Reduction of Stiffness

Dry-heat setting tends to produce a slight but appreciable stiffening of Tricel fabric. This can be shown under the microscope to be due partly to slight filament cohesion. A very thin film of cellulose on the surface of each filament is sufficient to prevent such cohesion and, consequently, much of the resultant stiffness. Such a film can be obtained by surface saponification to reduce the average acetyl value of the fibre from approximately 62 to 59.

Compared with Dicot, Tricel is very resistant to attack by alkali but can be saponified by suitably drastic means. Soda ash and ammonia do not saponify Tricel within a reasonable time, but caustic soda is suitable. Since saponification is here a surface effect, the thickness of the filaments and the fabric density will affect the degree of saponification obtained. Fig. 5 shows the relation between temperature, caustic soda concentration and reduction in acetyl value for a lingerie crêpe fabric (100-den. continuous-filament warp; 100-den. weft, 30 t.p.in. twist). For this fabric,

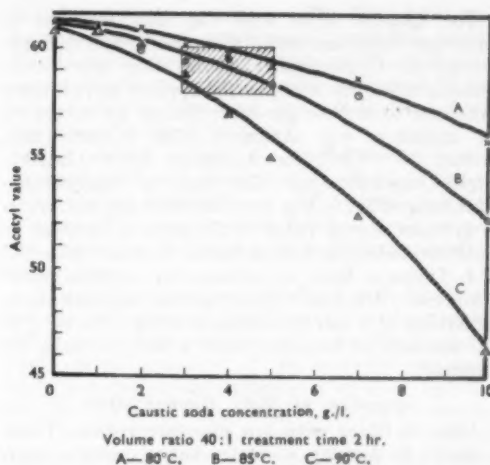


FIG. 5—Saponification of Tricel lingerie crêpe fabric (warp: 118 ends/in., 100/25/24; weft: 80 picks/in., 100/25/30)

treatment at 80–90°C. for 2 hr. with 3–5 g./l. caustic soda is suitable (shaded area of Fig. 5).

Knitted Tricel also can usually be processed satisfactorily under these conditions. Similarly, any method of processing, e.g. on beam or on the jig, in which the fabric is always kept flat can utilise these conditions. However, discretion must be used. For instance, a Tricel taffeta fabric would not be dyed in rope form; and evenness of saponification depends on the same factors as does levelness of dyeing.

Quite apart from its value in reducing the stiffening caused by dry-heat setting, slight saponification can produce appreciable softening and facilitates further softening by finishing agents.

Fastness to Gas-fume Fading

Certain dyes on Tricel, as on Dicot, are subject to gas-fume fading, which may be minimised by the use of suitable dyes or by inhibitors.

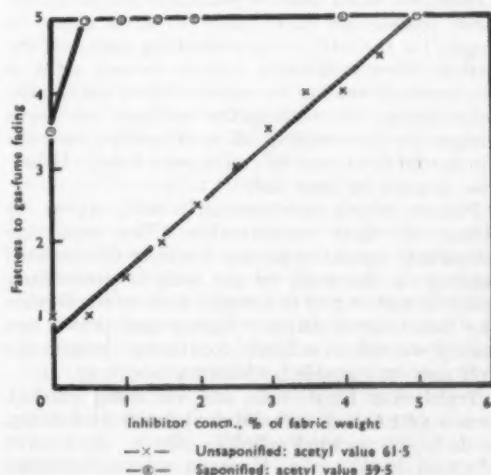


FIG. 6—Effect of saponification on gas-fume fading of Tricel dyed with Serisol Brilliant Blue BG

The disperse dyes with the best fastness to burnt-gas fumes are usually expensive and difficult to apply. Consequently, it is often more convenient to use the more easily applied and cheaper dyes and to reduce gas-fume fading by means of an inhibitor, e.g. Antiacid 3546 (Courtaulds), Protac 30 (YDC) or Inhibitor GFN (BASF). Slight saponification also has a considerable inhibiting effect. Fig. 6 shows that saponification to give an acetyl value of 59 gives a fastness to gas-fume fading of 3-4 for Serisol Brilliant Blue BG (C.I. Disperse Blue 3) without the application of inhibitor. Alternatively, by partial saponification, a fastness of 5 can be obtained using only 10% of the amount of inhibitor that would normally be required.

Reduction of Static Electrification

Like all fibres with low moisture regain, Tricel is liable to develop a static charge under certain conditions. To this effect has been attributed, particularly with nylon, excessive soiling in wear. It is thought that the sub-microscopic dust particles present in the atmosphere, especially of towns, are attracted to the fabric by charges developed by friction in wear and are so firmly held that they are not readily removed in washing. The attraction of small particles of carbon to the surface of a Tricel fabric which has been rubbed with, for example, a polystyrene rod, can be readily demonstrated in the laboratory. If the fabric has been previously saponified to the extent indicated above, the attraction is very materially reduced. Garments made from such saponified fabric are, similarly, much more resistant to soiling.

General Dyeing Procedures

SELECTION OF METHOD

Specific types of fabrics will now be considered. They will be divided into those that can be processed in rope form and those that cannot. Division into these two classes is similar to that with normal Dicot, and depends on the extent to which the fabric is liable to form permanent creases if crumpled when wet. When the fabric is in rope form, creases are most likely to form along its length, i.e. the weft is the controlling yarn. If the weft is either sufficiently soft, in its own right or as a result of wetting, to crease without permanent deformation, or sufficiently resilient to resist adequately the crushing effect of running over the winch, the fabric can be run in rope form. Otherwise it must be kept flat.

Fabrics which are inherently soft, are so by virtue of their construction. The ends are sufficiently spaced to permit virtually unrestricted bending of the weft; or the weft is particularly bulky or soft, e.g. it is a staple yarn or a soft yarn like Courttelle or Orlon. Rayon and cotton are readily wetted, so a fabric containing them in the weft may be suitable for winch processing.

Tricel, like Dicot, does not, on being twisted, form a yarn which will shrink violently on wetting, as do highly twisted cellulosic fibres. At a twist of about 30-40 t.p.in., however, a so-called crêpe yarn is produced which is dense and resilient and eminently suited to the production of marocain

and crêpe-de-chine cloths. Such fabrics are very suitable for winch processing.

JIGGER DYEING AND USE OF CARRIERS

Fabrics containing low-twist Tricel only, in constructions such as poults, taffetas, jappes, twills and satins, must always be processed in open width, generally on the jigger. The repeated passage from roller to roller inevitably results in the application of tension, and pressure is built up when layer on layer of fabric is batched on the jig roller. Under the hot, wet conditions of jigger dyeing, tension tends to extend the fabric and pressure of layer on layer tends to produce watering, which is especially liable to occur on fabrics having a pronounced rib. Although these defects are less likely to occur on Tricel than on Dicot, it is still essential that tensions during jigger processing should be kept as low as is consistent with satisfactory running.

Since Tricel dyes more slowly than Dicot, it is desirable to use the highest possible dyeing temperature. Indeed, when dyeing very full depths it may occasionally be necessary to use a carrier to ensure adequate depth with freedom from rubbing. Carriers should be used only when essential; Carrier LBN (Courtaulds) and DPE 66 (YDC) are suitable. Carrier LBN is used at a concentration of 12% of the weight of goods, with a minimum concentration of 3 g./l., whilst the recommended concentration for DPE 66 is 2-3 g./l.

HIGH-TEMPERATURE DYEING

An alternative to the use of a carrier when full depths are required is the use of temperatures above 100°C. This procedure has been advocated for dyeing polyamide and polyester fibres, and many dyers have installed suitable equipment. The equipment for fabrics may be of two types: (a) machines in which normal jig-dyeing is done inside a pressure vessel, and (b) machines in which the liquor is moved through stationary fabric.

Sampling for shading is difficult under these conditions, and considerable ingenuity has been shown by machine makers in overcoming the problem. In the first type of machine the fabric is sewn end to end in the normal manner. In the second type, each piece of about 60-100 yd. is sometimes, but not always, rolled on to a separate perforated tube. This must be of a more robust type than is used in steam setting, since it will have to withstand the stresses set up by liquor movements. Where one piece per beam is recommended, it is usual for the pressure vessel to hold several, say six, beams. At least one such machine provides for rotation of the system of beams and of each beam individually. In this type of apparatus, provision is made for shading without releasing the pressure in the main vessel, e.g. by using a small side-vessel, containing a sample of fabric identical with the bulk, which is fed by by-passed liquor and which can be isolated from the bulk and readily opened for sampling. A similar side-line can be utilised for adding dye.

One make of machine, by an ingenious depressurising device, permits some of the liquor to be bled off from the main flow into an open vessel

into which dye can be introduced and from which the liquor is returned to the pressure vessel.

WINCH DYEING

Winch processing of Tricel is similar to that of Dicot. Higher temperatures are permissible if the fabric is capable of withstanding such temperatures without permanent damage. In practice, fabric construction is usually the ultimate deciding factor. The winches are generally of the shallow type used for processing acetate fabrics and, as in jig treatment, fabric tensions are kept as low as possible. Use of a gate to encourage changing of folds is desirable, and it is essential to avoid laying up fabric without previously cooling it to about 45°C.

As for Dicot, fabrics containing appreciable quantities of Tricel must be relaxed by some form of wet treatment in open-width before being run in rope form. The simplest procedure is to wind on to a collapsible frame, the multilayer tube so formed being then collapsed and supported on sticks from which it is suspended, with frequent turning, in the steeping bath.

When conditions and volume of work permit, a continuous relaxation treatment is convenient. For this, the fabric is sewn end to end in batches of convenient size and run, free from tension, through a bath or a series of baths in open width. A type of machine which is deservedly popular for this purpose (e.g. Mezzera, Hinnekens, Lanfrancini) carries the fabric through the liquor in the form of loops, suspended on metal rods. In order to avoid pressure marks, the rods are slowly lifted and quickly dropped at short intervals, thus leaving the fabric freely suspended for a short time, finally to settle back on to the rods in a slightly different position. This type of machine holds a large quantity of fabric and can be used for prolonged steeping.

Fabrics that have been steeped continuously are in suitable form for spiral running on the winch, should suitable winches be available, thus economising in after-handling.

The composition of the steeping liquor is relatively unimportant. The purpose is to release strains in the fabric, and rapid wetting assists this. Any wetting agent is therefore suitable, but is conveniently chosen to assist subsequent processing. Thus, if an acid bath is to be used for dyeing, it would be unwise to use soap in the steeping bath.

Relaxation of the fabric is followed by scouring. When no other fibre is present, this is very simple, a typical bath being 0.5% soap or synthetic detergent with 0.05% soda ash. On the jig, after bedding down cold, the bath is heated to 50°C. for two ends, and then to 85°C. for two ends; on the winch, fabric is run in rope form for 30 min. Any starch size present must be removed by means of one of the usual desizing agents.

PROCESSING OF FABRIC CONTAINING PRE-COLOURED YARNS

The range of possible fabrics is enormously increased by the use of pre-coloured yarns, e.g. in tie fabrics, striped, check, and shot dress fabrics, and in shirtings. Two ranges of pre-coloured

Tricel yarns are available. The Tricel-Duracol* range consists of nine mass-pigmented colours. These yarns meet the most exacting fastness requirements, with the possible exception of fastness to chlorite bleaching, and can be treated with confidence in the dyehouse.

The second range of pre-coloured yarns is package-dyed and consists of 17 standard colours, others being available at a slightly higher cost. Disperse dyes are generally used, so the dyer must use discretion in dealing with fabrics containing these yarns.

It is advisable, when presented with fabric containing pre-coloured yarn, to examine its marking-off properties by carrying out a simple laboratory test. Small cuttings of the material are rolled tightly, together with samples of undyed Tricel, on to glass rods. These samples are then immersed for 1 hr. in water or a scouring bath, at different temperatures. After examination of the undyed samples for staining, conditions for bulk treatment can be suitably adjusted.

Interpretation of the results of such a test requires some care. Thus, a flat tie fabric, wholly constructed of dyed yarns, is much less liable to produce a serious "mark-off" than is a shirting material in which dyed stripes appear at intervals on a white ground.

The ideal apparatus for processing such fabrics is an open-soaper range, fitted at the off-loading end with a suction tube and delivering direct to a drying machine. In addition to limiting the temperature, the obvious precaution which should be taken to avoid marking off is the avoidance of prolonged contact of dyed and undyed (or of contrastingly dyed) portions of wet fabric.

CROSS DYEING

Multi-colour effects can also be obtained by cross dyeing. Even Dicot, combined with Tricel, can give two-tone effects, but for more contrasting effects, fibres with quite different dyeing properties must be used. These other fibres may be present in isolated areas of the fabric, thus providing the maximum contrast in colour, or as an intimate blend with the Tricel. In the latter case, a solid effect is usually required.

The most common combination is probably Tricel and either cotton or viscose rayon, in particular strong viscose rayon. In checks and similar constructions this combination is being used for cross-dyed dress goods. Dyeing procedures are the same as for similar fabrics containing Dicot. Care is required with large checks to avoid creasing of the squares of one fibre because of shrinkage of the other. Thus, if a Tricel-cotton fabric having 2 in. squares is treated on the jig, uneven swelling of Tricel and cotton, together with uneven thickness of the warps causing ridgy build-up of the batch, produces flat cotton squares, with slack Tricel squares that inevitably become creased during scouring in roll form. Such a fabric must, therefore, be processed on the winch, although the construction of the Tricel areas would normally indicate treatment on the jig. Any bulging of the

* The trade mark "Duracol" denotes that the relevant fibres are mass-pigmented.

Tricel areas which occurs on the winch is not subjected to pressure due to rolling; when the fabric is finally finished, these areas can be flattened.

Fabrics made from intimate blends of Tricel and viscose rayon staple are generally sufficiently soft to run satisfactorily on the winch. Thus, blends of 67% Tricel and 33% rayon staple are commonly used for dress goods; it is usual to remove the longest loose filaments by light singeing, after which the fabric is winch-dyed. For shirtings, however, a very clean finish is required. This may be achieved by careful but thorough singeing, in the grey or after scouring, or by a final cropping. A good-quality fabric of this type may be sufficiently firm to require dyeing on the jig.

Dyes for Tricel must be selected with the ultimate use in mind. Since one of the outstanding properties of Tricel is its suitability for durable pleating, this operation frequently follows dyeing and the dyes used must withstand such treatment.

DYEINGS FAST TO PLEATING

Pleating can be of one of two types—

(1) *Machine pleating*, in which the fabric is mechanically folded and subjected, while sandwiched between two sheets of thin paper, to pressure between surfaces heated to 170–200°C. The pleated sandwich is then steamed on a roller under the conditions described for hand steam pleating.

(2) *Hand steam pleating* is used for the production of tapered pleats, which must be manually prepared by inserting suitably cut panels between prefolded paper formers. The prepared package is then set by steaming under conditions which depend on the construction of the fabric and its previous history. Thus, an unset, 100% Tricel fabric of normal weight can be adequately "fixed" by steaming for 10–30 min. at 10–15 lb./sq.in. If however, the fabric has previously been set, it is usually necessary to steam at a pressure of at least 20 lb./sq.in.

Presetting of fabric destined later to be pleated is often justified by the following considerations—

(a) The holding and segregation of two stocks is avoided.

(b) Any hue change which may occur during pleating due to incomplete dye penetration (caused by inadequate dyeing time or temperature) can be produced on the unpleated material by setting after dyeing, thus ensuring that pleated and unpleated portions of a garment are identical in shade.

A suitable range of dyes having good all-round fastness, including good fastness to pleating, would include the following or their equivalents—

Serisol Fast Yellow YGL
Latyl Yellow YL
Artisil Orange RFL (C.I. Disperse Orange 21)
Artisil Scarlet GFL (C.I. Disperse Red 43)
Serisol Fast Red NGGL (C.I. Disperse Red 35)
Fenacet Violet 5RD
Serisol Fast Blue BGL (C.I. Disperse Blue 27)
Latyl Blue FL
Fenacet Blue L (C.I. Disperse Blue 27)

For less stringent fastness requirements and for increased range of colour, the following are very desirable additions to the list—

Serisol Fast Yellow PL (C.I. Disperse Yellow 9)
Serisol Fast Yellow 5GD (C.I. Disperse Yellow 5)
Serisol Fast Red BGL
Serisol Fast Red 2RDX (C.I. Disperse Red 17)
Serisol Fast Blue Green BW (C.I. Disperse Blue 7)
Serisol Fast Rubine BD (C.I. Disperse Red 5)
Duranol Brilliant Blue B (C.I. Disperse Blue 3)
Cibacet Sapphire Blue 4G (C.I. Disperse Blue 16)
Serilene Dark Blue G (C.I. Disperse Blue 35)

It should be noted that, since Tricel is very resistant to saponification, vat dyeing of any cellulosic fibres with which the Tricel is blended can be carried out much more readily than with Dicot-cellulosic fibre mixtures; in fact, almost as easily as dyeing of cellulosic fibres alone. Except for dyeings of the highest fastness, it is usual to employ the fastest acetate-resist direct dyes for Tricel-cellulosic fibre blends and mixtures. Here again, it is necessary to ensure that the dyes used are of adequate fastness to pleating.

Mixtures or blends with wool, common in pleated skirtings, suitings and trouserings, are also dyed in similar manner to Dicot-wool blends. Dimensional stability is important. When wool is blended with a considerable proportion (50–70%) of Tricel, its felting properties become masked, so that milling will not produce a great effect; if the fabric is fully relaxed, it will have little tendency to shrink. For a regular, unblemished surface appearance, however, it is usually very desirable to crab the fabric in boiling water before dyeing. It is important to remember that all disperse dyes stain wool to some extent, and that the stain is liable to have low fastness to rubbing, light and perspiration. It must therefore be avoided, as far as possible, and the residual stain which is inevitable must be cleared by after-treatment. Staining of wool with disperse dyes can be minimised by—

(a) Selection of those dyes which stain least, a few of which are—

Serisol Fast Yellow YGL
Latyl Yellow YL
Serisol Fast Red NGGL (C.I. Disperse Red 35)
Cibacet Brilliant Scarlet RG (C.I. Disperse Red 12)
Celanthrene Violet BGF (C.I. Disperse Blue 8)
Serisol Fast Blue BRL (C.I. Disperse Blue 19)
Serilene Dark Blue G (C.I. Disperse Blue 35)
Cibacet Sapphire Blue 4G (C.I. Disperse Blue 16)

(b) Avoidance of acidity until the disperse dyes are largely absorbed

(c) Use (more especially when dyeing pale colours) of such auxiliaries as Lissatan AC (ICI), Dyapol PT (YDC) or Lubrol E (ICI)

(d) Inclusion of a carrier in the dyebath, e.g. DPE 66 (YDC). The recommended carrier concentration must not be exceeded, otherwise the plasticising effect of the absorbed carrier will result in a depression of the fibre softening point and, consequently, in less satisfactory ironing properties.

Dyeing may be carried out by the single-bath or the two-bath method, the latter being preferred for full depths. In either case, except for the palest colours, dyeing must be followed by a clearing

treatment, e.g. with a solution of 2 g./l. Lissapol NC for 15 min. at 65°C. Since this is the final operation, allowance must be made for some loss at this stage by giving an accelerated scour (adapted to suit individual conditions) to shading samples when the dyeing is nearing completion.

BLACKS AND NAVY BLUES

These colours are generally produced on Tricel, as on Dicot, with azoic dyes, the base being of the disperse type.

The most satisfactory azoic black is C.I. Disperse Black 1 coupled with β -hydroxynaphthoic acid. These are the components most commonly used for dyeing Dicot black, but the procedure for Tricel is rather different, a modified concurrent process being used. The base is first applied at the highest suitable temperature in the normal manner and rinsed. The developer is then applied from a fresh bath at pH 3.5. After rinsing, the base is diazotised at 25–30°C., using double the concentration of nitrous acid required for Dicot, and simultaneously coupled with the developer. A final clearing with sodium hydro-sulphite or a detergent should be given.

Brenthols FR and OT (ICI) have been claimed to give somewhat better fastness than β -hydroxynaphthoic acid, but they require the use of high application temperatures, or a carrier such as diethyl phthalate and, in our experience, they do not give such a good colour.

The best navy blue is obtained with C.I. Disperse Navy 11, applied in the normal manner, diazotised at 20–25°C. with double the normal quantity of nitrous acid, and coupled with C.I. Developer 9. It is important to ensure that free nitrous acid is removed before coupling; urea or sulphamic acid can be used for this purpose. The concurrent process can also be used for dyeing Tricel navy blue.

Finishing

CONTROL OF HANDLE

The finishing of Tricel and its blends and mixtures follows the general practice for similar materials made from Dicot. Stenter drying is suitable for those fabrics which do not depend for their appeal on maximum relaxation. Otherwise, the ideal procedure is to slack-dry, preferably on a short loop drier or on a machine of the "air-lay" type. Then the material is steamed, with over-feed, on a pin stenter.

Control of handle can be achieved by means of stiffening agents or softeners, assisted, if necessary, by mild saponification. Lubricants, e.g. emulsions of oils or fats, can assist in softening to some extent, but for greater effect, cationic agents, e.g. Ceranine HC39 (S), Velan PF (ICI), Gemex Z7 (Union Carbide Co.) or certain Sapamines (Ciba), are very suitable. These give moderately durable, soft finishes; for maximum resistance to washing and dry-cleaning, silicones can be used. The application of stiffening agents for the control of handle is best avoided if possible. It is better to rely on the inherent stiffness of the fabric, enhanced by suitable processing, than to apply materials such as resins, which must, since the fibre has little power of absorbency, largely lie on the surface and

so inevitably produce a liability to "chalk-marking". If the application of stiffening agents is unavoidable, materials of the following types are recommended—

(1) *For a wash-resistant, stiff and brittle finish* use an alkylated melamine-formaldehyde precondensate, e.g. Lyofix CH (Ciba), which requires baking in the presence of a catalyst, e.g. ammonium chloride, followed by thorough washing. This type of finish is moderately free from chalk-marking.

(2) *For full flexible stiffness* similar to that of the fabric in the loom state, use a dispersion of a higher alcohol polymethacrylate, e.g. Bedacryl S (ICI). This is reasonably fast to washing without baking, but high concentrations (e.g. 100–300 g./litre) are required. Chalk-marking is not serious.

(3) *For an unstoved finish* of moderate stiffening power, use a polyvinyl acetate dispersion, e.g. Calatac VA (ICI). This stiffening is reasonably fast to washing, but is liable to show serious chalk-marking.

CONTROL OF CHALK-MARKING

Chalk-marking can be considerably reduced, and often eliminated, by suitable mechanical treatment. Cold calendaring is sometimes effective. A more drastic treatment is to use a breaking machine, in which the fabric is pulled under tension over a straight edge of thin metal.

CREASE-RESIST FINISHES

The crease resistance of Tricel fabrics is closely related to their construction. In similar constructions, the dry crease-recovery of Tricel is better than that of viscose rayon, but less than that of viscose rayon treated with urea-formaldehyde (U/F) resin. The low absorptive properties of Tricel do not permit U/F resins to penetrate sufficiently to improve crease recovery. Indeed, since the resin is almost entirely confined to the fibre surface, crease recovery, as well as handle and chalk-marking, will be adversely affected. In blends containing about 50% viscose rayon or cotton, it may be beneficial to apply a U/F resin, but the "pick-up" should be determined in relation to the cellulosic fibre content only.

It is even more important than with 100% viscose rayon, that efficient washing off should follow polymerisation, since undesirable residues are likely to have an adverse effect on fastness to plecting and abrasion resistance.

"MINIMUM-CARE" FINISHES

Much Tricel is being used in "minimum-care" materials. Suitable processing conditions for knitted fabrics have already been given. For woven fabrics, decatizing is the operation which, above all others, improves resistance to creasing during subsequent laundering. A convenient steam pressure in the mains feeding the decatizer is 60 lb./sq.in., and the steaming time should be at least 1½ min.

Conclusions

This review of the properties of Tricel and of the processes suitable for dyeing and finishing has

established that its behaviour is, in many respects, similar to that of Dixel. Since it is less sensitive to high temperature when wet, and is less absorbent, the conditions of processing may with advantage be rather more severe than for Dixel. The guiding principle should always be to keep in mind the thermoplastic properties of Tricel, making use of them whenever possible, and never allowing them to assume control of the situation.

* * *

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COMMUNICATION

The Mechanism of Dyeing with Procion Dyes I—The Mechanism of Alkali Adsorption by Cellulose*

H. H. SUMNER

A brief historical survey is given of previous work on the mechanism of adsorption of alkali by cellulose, in which three possibilities are considered: adsorption, because the hydroxyl ion has affinity for cellulose, compound formation between alkali and cellulose, and neutralisation of the alkali by the cellulose acting as a weak acid. Using the third mechanism, a theoretical treatment involving the normal concepts of dyeing thermodynamics has been set out; it successfully predicts the amount of sodium hydroxide that will be adsorbed from alkaline baths by both viscose rayon and cotton. A discussion is given of the way in which this treatment enables affinities to be calculated for adsorption of dye from aqueous alkaline dyebaths; and it is also shown how the concept of ionised cellulose hydroxyl groups, produced by neutralisation of alkali by the fibre, provides a mechanism for dyeing with reactive dyes.

INTRODUCTION

When considering the application of a dye to a fibre from an alkaline dyebath, it is necessary, before any complete picture of the operative mechanism can be obtained, to know the effects, both chemical and physical, of the alkali on the fibre. Such is the case for Procion dyes, which are applied to cellulose from alkaline solution.

In the last hundred years much work has been carried out on the system cellulose-sodium hydroxide-water in attempts to explain the mechanism of mercerisation. A brief summary of the work for the 80 years preceding 1928 is presented by Blanco¹, so that a detailed review of this period is not necessary here. Briefly, however, workers before this date postulated three types of mechanism—adsorption, distribution of sodium hydroxide between cellulose and water, or formation of a chemical compound. Although each piece of work gave apparently self-consistent results, the actual mechanism was not well explained or understood.

These ideas have been the bases of mechanisms proposed by later workers. The adsorption^{2,3}, partition⁴, and compound-formation⁵⁻⁸ mechanisms have all received support. There appears to be very little agreement, however, between the supporters of the third mechanism on the precise constitution of the compound formed.

The suggestion has also been made^{9,10} that the mechanism of adsorption of sodium hydroxide by cellulose is ionic, the cellulose acting as a weak acid which is neutralised by hydroxyl ions to form dissociated sodium cellulosate. Neale¹¹ was the first to calculate the dissociation constant (K) of

the hydroxyl groups in cellulose by applying the Donnan theory of membrane equilibrium to his results, to obtain a figure of 1.84×10^{-14} at 25°C. Unfortunately, all Neale's work was carried out at high concentrations of sodium hydroxide, and when Saric and Schofield¹² attempted to titrate cellulose over a wide range of hydroxide concentrations they obtained a higher value for K at lower alkali concentrations. Above 5 N. alkali, however, their value is identical with that of Neale. This is presumably because increased swelling of the cellulose at the higher concentrations makes more hydroxyl groups available for attack. That Neale's value of 1.84×10^{-14} is realistic is confirmed by measurements of the dissociation constants of the hydroxyl groups in other carbohydrates, viz. wheat starch¹² (5×10^{-14}), alginate¹² (5×10^{-14}), mannitol^{13,14} (7.5×10^{-14} ; 3.2×10^{-14}) and sorbitol¹⁴ (3.7×10^{-14}). The value for cellulose is of the same order as values for the other carbohydrates.

This work is of particular interest because recent measurements suggest that dyeing with Procion dyes involves the ionised hydroxyl groups in cellulose; in order to investigate this theory it is necessary to calculate the number of these groups present at any alkaline pH. This should be possible, using Neale's value for the dissociation constant, but unfortunately at low concentrations of alkali all the hydroxyl groups are not available¹². It is therefore necessary to introduce an "availability" term into the calculation. Also, because concentrations of dye on fibre are quoted in amounts per litre of fibre, it is necessary to ensure that the "V term" the volume of the surface phase

* This paper formed part of a lecture to the Manchester Section at the Manchester College of Science and Technology on 16th October 1959, Mr. H. A. Turner in the chair, and to the Northern Ireland Section at the Grosvenor Rooms, Belfast, on 1st December 1959, Mr. W. Graham in the chair.

associated with 1 kg. of fibre¹⁵, is realistic over the range of pH used in Procion dyeing. This paper discusses (a) calculations of the amount of alkali adsorbed by various types of cellulose, taking into account the above factors, comparing the result with experimentally determined values and (b) calculations of the concentration of ionised hydroxyl groups in cellulose for any dyebath pH and electrolyte concentration.

Theoretical

If cellulose dissociates according to the equation

$\text{AOH} \rightleftharpoons \text{AO}^- + \text{H}^+$ where A = cellulose residue then

$$K_{\text{AOH}} = \frac{a_{\text{AO}^-} \cdot a_{\text{H}^+}}{a_{\text{AOH}}}$$

from which, using the fact that $K_W = a_{\text{H}^+} \times a_{\text{OH}^-}$

$$\begin{aligned} K_{\text{AOH}} &= \frac{a_{\text{AO}^-}}{a_{\text{AOH}}} \cdot \frac{K_W}{a_{\text{OH}^-}} \\ &= \frac{K_W [\text{AO}^-]}{[\text{AOH}] [\text{OH}^-]} \cdot \frac{\gamma_{\text{AO}^-}}{\gamma_{\text{AOH}} \cdot \gamma_{\text{OH}^-}} \end{aligned}$$

where γ = activity coefficient, and $[X]$ = concentration of species X in g. moles or g. ions per litre (all concentrations will be expressed in this way to eliminate the need for introducing the volume term V into the equations).

For convenience, this equation may be re-written

$$K'_{\text{AOH}} = \frac{K_W [\text{AO}^-]}{[\text{AOH}] [\text{OH}^-]}$$

where

$$K'_{\text{AOH}} = K_{\text{AOH}} \frac{\gamma_{\text{AOH}} \gamma_{\text{OH}^-}}{\gamma_{\text{AO}^-}}$$

Therefore,

$$[\text{AO}^-] = \frac{K'_{\text{AOH}}}{K_W} [\text{OH}^-] [\text{AOH}]$$

and if Q = total concentration of available cellulose hydroxyl groups

$$[\text{AO}^-] = \frac{K'_{\text{AOH}}}{K_W} [\text{OH}^-] (Q - [\text{AO}^-])$$

which simplifies to

$$[\text{AO}^-] = \frac{Q K'_{\text{AOH}} [\text{OH}^-]}{K_W + K'_{\text{AOH}} [\text{OH}^-]} \quad \dots (1)$$

Considering cellulose in equilibrium with an aqueous solution of sodium hydroxide and sodium chloride, and applying the Donnan theory of membrane equilibrium, then

$$a_{\text{Na}^+ F} \cdot a_{\text{OH}^- F} = a_{\text{Na}^+ S} \cdot a_{\text{OH}^- S}$$

and

$$a_{\text{Na}^+ F} \cdot a_{\text{Cl}^- F} = a_{\text{Na}^+ S} \cdot a_{\text{Cl}^- S}$$

where subscripts F and S refer to fibre and solution respectively. Unfortunately, because no figures are available for activities in the fibre, it is necessary to make the simplifying assumption that the activity coefficient products will be the same on both sides of the equations, so that

$$[\text{Na}^+]_F [\text{OH}^-]_F = [\text{Na}^+]_S [\text{OH}^-]_S \quad \dots (2)$$

$$[\text{Na}^+]_F [\text{Cl}^-]_F = [\text{Na}^+]_S [\text{Cl}^-]_S \quad \dots (3)$$

In this treatment the anions in the bath, hydroxyl ion excepted, are replaced by an equivalent quantity of chloride ions, any bivalent

ions being replaced by twice the number of chloride ions.

In addition, for electrical neutrality,

$$[\text{Na}^+]_F = [\text{Cl}^-]_F + [\text{OH}^-]_F + [\text{ACOO}^-] + [\text{AO}^-] \dots (4)$$

where $[\text{ACOO}^-]$ = concentration of ionised carboxyl groups in the fibre. Substituting in eqn. (4), using eqn. (1), (2) and (3) and considering that the concentration of hydroxyl ion used in eqn. (1) is that in the internal cellulose phase, then

$$\begin{aligned} [\text{Na}^+]_F &= \frac{[\text{Na}^+]_S [\text{Cl}^-]_S}{[\text{Na}^+]_F} + \frac{[\text{Na}^+]_S [\text{OH}^-]_S}{[\text{Na}^+]_F} \\ &+ [\text{ACOO}^-] + \frac{Q K'_{\text{AOH}} \frac{[\text{Na}^+]_S [\text{OH}^-]_S}{[\text{Na}^+]_F}}{K_W + K'_{\text{AOH}} \frac{[\text{Na}^+]_S [\text{OH}^-]_S}{[\text{Na}^+]_F}} \end{aligned}$$

This equation can be rearranged in the form

$$\begin{aligned} [\text{Na}^+]_F^2 K_W + [\text{Na}^+]_F^2 ([\text{Na}^+]_S [\text{OH}^-]_S K'_{\text{AOH}} - [\text{ACOO}^-] K_W) \\ - [\text{Na}^+]_F ([\text{Na}^+]_S (K_W [\text{Cl}^-]_S + [\text{OH}^-]_S (K_W + [\text{ACOO}^-] K'_{\text{AOH}} + Q K'_{\text{AOH}}))) \\ - K'_{\text{AOH}} [\text{Na}^+]_S [\text{OH}^-]_S ([\text{Na}^+]_S [\text{Cl}^-]_S + [\text{Na}^+]_S [\text{OH}^-]_S) = 0 \quad \dots (5) \end{aligned}$$

Using this equation, $[\text{Na}^+]_F$ can be calculated for any concentration of alkali and salt. Two points still require to be clarified. Firstly:

$$K'_{\text{AOH}} = K_{\text{AOH}} \frac{\gamma_{\text{AOH}} \gamma_{\text{OH}^- F}}{\gamma_{\text{AO}^-}}$$

where, for lack of precise information, it is necessary to assume that $\gamma_{\text{OH}^- F} = \gamma_{\text{AO}^-}$ and that $\gamma_{\text{AOH}} = 1$, so that $K'_{\text{AOH}} = K_{\text{AOH}}$. Secondly, it is necessary to assign a value to Q , the concentration of cellulose hydroxyl groups accessible. Mann and Marrinan¹⁶ concluded from their work on the deuteration of cellulose that 74% of the hydroxyl groups in viscose rayon were available. Unfortunately, no similar figure is given for cotton, merely a figure of 31% for cotton micelles obtained by hydrolysis of cotton cellulose. It is therefore necessary to calculate the number available. Sharples¹⁷ and Achwal *et al.*¹⁸ concluded, using a technique of acid hydrolysis, that 86% of standard cellulose was crystalline. If 31% of this is available, the total amount in both crystalline and amorphous regions is 41%. These accessibility figures agree with those estimated from moisture regain measurements by Howsmon¹⁹, who obtained values of 74% for viscose rayon and 40% for cotton. Since cellulose possesses 6-17 moles of glucose residues per kg., it is possible to calculate the number of equivalents of accessible hydroxyl group per kg. and hence, by employing the usual "V" term (0.45 l./kg. for viscose rayon and 0.22 l./kg. for cotton) the number of equivalents per litre. $[\text{OH}^-]_F$ is calculated by substituting for $[\text{Na}^+]_F$, $[\text{Na}^+]_S$ and $[\text{OH}^-]_S$ in eqn. (2).

In order to calculate the amount of hydroxyl ion adsorbed from any dyebath, it is first necessary to calculate $[\text{OH}^-]_F$ for the particular dyebath condition, as above, and then determine $[\text{AO}^-]$ by substitution in eqn. (1). Then the amount of hydroxyl ion adsorbed is

$$[\text{OH}^-]_{\text{ads}} = [\text{OH}^-]_F + [\text{ACOO}^-] + [\text{AO}^-] \quad \dots (6)$$

For the work on Procion dyes, the results of which will be described in subsequent papers, a standard series of sodium bicarbonate-carbonate-hydroxide buffers was used. It is therefore necessary to repeat the above calculations using these experimental conditions, and also to allow for the fact that adsorbed dye will also affect the value of $[Na^+]_F$. Thus, eqn. (4) becomes

$$[Na^+]_F = [Cl^-]_F + [OH^-]_F + [ACOO^-] + [AO^-] + z[D^{z-}]_F \quad \dots (4a)$$

where D^{z-} refers to dye anion of basicity z and (5) becomes

$$\begin{aligned} & [Na^+]_F K_W + [Na^+]_F (K'_{AOH} [Na^+]_S [OH^-]_S \\ & \quad - K_W ([ACOO^-] + z[D^{z-}]_F)) \\ & - [Na^+]_F \left\{ [Na^+]_S \{ K_W [Cl^-]_S + [OH^-]_S (K_W \right. \\ & \quad \left. + K'_{AOH} [ACOO^-] + Q + z[D^{z-}]_F) \} \right\} \\ & - K'_{AOH} [Na^+]_S [OH^-]_S ([Na^+]_S [Cl^-]_S \\ & \quad + [Na^+]_S [OH^-]_S) = 0 \quad \dots (5a) \end{aligned}$$

Experimental

For the experiments carried out in weak alkaline solutions (10^{-4} – 10^{-1} N.) containing no other electrolyte, concentrations of alkali were determined by conductivity measurements, using a Mullard conductivity bridge and dip type cell, operating on a frequency of 1 kc./sec.

Heavy spun viscose rayon yarn (20 g.) was scoured with soap (3 g./l.) and sodium carbonate (2 g./l.) at 60°C. for 20 min. After being rinsed in tap water, the yarn was acidified with a small amount of hydrochloric acid and then thoroughly rinsed in tap water followed by distilled water. The yarn was next wound loosely in a stainless steel wire-mesh cage fitted in a 600-ml. tall-form beaker equipped with a rubber bung through which passed a stainless steel stirrer, a burette, the conductivity cell and tubes for passing nitrogen into the beaker. Rinsing of the yarn was then continued with water from a Bio-deminrolit ion-exchange column until the water showed no change in conductivity on being stirred over the yarn for several hours.

The water in the beaker was made up to approximately 500 ml. and alkali was then added, using first 0.1 N., then 1.0 N., and finally 5 N. alkali as the required alkali concentration increased, to prevent too great a change in bath volume. After each addition the resistance of the solution was measured at 5-min. intervals until three consecutive measurements were identical. This was generally after approx. 30 min. From the measured resistance, the concentration of alkali in the bath was determined from a calibration curve, the amount adsorbed by the fibre being obtained by difference.

At the end of the experiment the beaker and its contents were weighed and the yarn was removed, dried, and weighed. From these weights and the dry weight of beaker and cage, the weight of solution present at the end could be found and hence the weight after each addition, by making the necessary correction for the volume of alkali added.

At the higher concentrations of alkali (0.1–4 N.) a simpler method was used. Hanks of viscose rayon yarn (5 g.) were scoured, rinsed, acidified, rinsed, and dried. After being weighed, they were immersed in 60 ml. of alkali solution in glass-stoppered tubes. The air in the tubes was displaced by nitrogen and the tubes were agitated for approx. 4 hr. Samples of the liquor were then titrated with standard hydrochloric acid.

Results and Discussion

The first step was to solve eqn. (5) for $[Na^+]_F$ using different bath conditions, namely varying pH and concentration of neutral electrolyte, at 20°C. The constants used are listed in Table I.

TABLE I
Constants Used in Calculations

Quantity	Viscose Rayon	Cotton
K_W	6.87×10^{-15}	6.87×10^{-15}
K_{AOH}^*	1.84×10^{-14}	1.84×10^{-14}
V (l./kg.)	0.45	0.22
Concentration of ionised carboxyl $[ACOO^-]$ (equiv./l.)	4.6×10^{-3}	9.1×10^{-3}
Availability (%)	74	41
Number of glucose residues (mole/kg.)	6.17	6.17
Available glucose residues (mole/kg.)	4.57	2.47
Available glucose residues (Q) (mole/l.)	10.15	11.22

* This value is that calculated for 25°C. by Neale¹¹. Since no information is available for the heat of ionisation, it has been used here in work at 20°C.

In both cases it was assumed that only one hydroxyl group per glucose unit was involved in the neutralisation. Then the appropriate values of $[OH^-]_F$ were calculated by using these values of $[Na^+]_F$ and the known values of $[Na^+]_S$ and $[OH^-]_S$ in eqn. (2). The calculated values of log

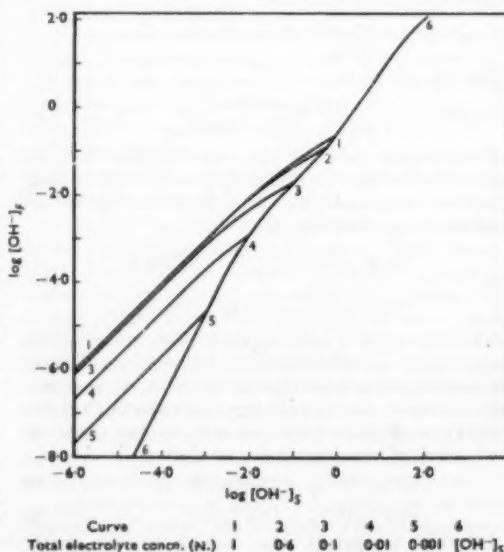
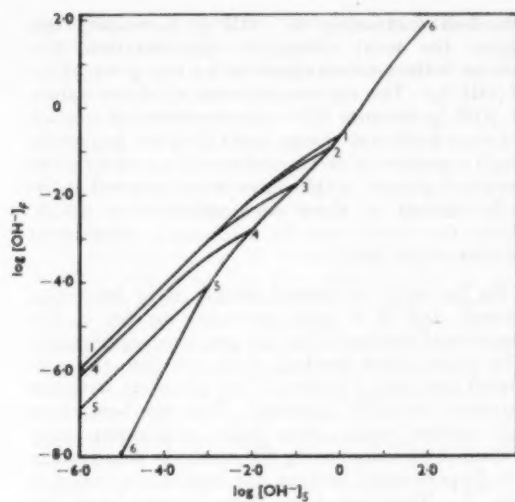


Fig. 1.—Calculated values of $[OH^-]_F$ and $[OH^-]_S$ for different total electrolyte concentrations (Viscose rayon)

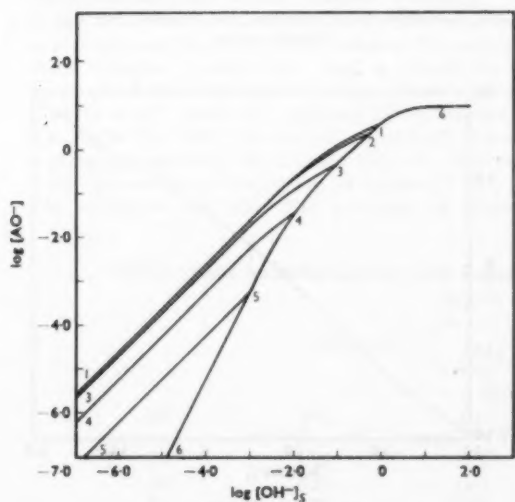


Curve
Total electrolyte concn. (N.) 1 2 3 4 5 6
1 0.6 0.1 0.01 0.001 [OH]ₛ

FIG. 2—Calculated values of $[\text{OH}^-]_p$ and $[\text{OH}^-]_s$ for different total electrolyte concentrations (Cotton)

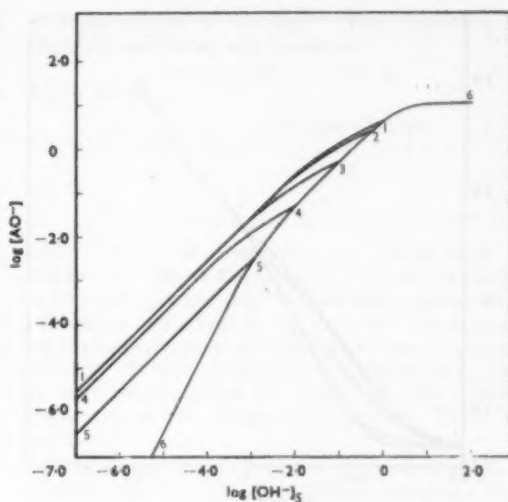
$[\text{OH}^-]_p$ are plotted against $\log [\text{OH}^-]_s$ in Fig. 1 (viscose rayon) and Fig. 2 (cotton) for various concentrations of neutral electrolyte.

The main conclusion that can be drawn from these calculated figures is that, when this hypothesis and method of calculation are used, the predicted concentration of hydroxyl ions in the fibre, $[\text{OH}^-]_p$, is always lower than that in the bath $[\text{OH}^-]_s$. The difference between the two depends on the total concentration of electrolyte in the bath; the higher this concentration the nearer $[\text{OH}^-]_p$ approaches $[\text{OH}^-]_s$, particularly at low concentrations of hydroxyl ion in the bath. Thus, in Fig. 1 and 2, line 6-6 represents the results



Curve
Total electrolyte concn. (N.) 1 2 3 4 5 6
1 0.6 0.1 0.01 0.001 [OH]ₛ

FIG. 3—Calculated concentration of ionised hydroxyl groups in cellulose for various dye bath conditions (Viscose rayon)



Curve
Total electrolyte concn. (N.) 1 2 3 4 5 6
1 0.6 0.1 0.01 0.001 [OH]ₛ

FIG. 4—Calculated concentration of ionised hydroxyl groups in cellulose for various dye bath conditions (Cotton)

where the only electrolyte is sodium hydroxide, and lines 5-5, 4-4, 3-3, 2-2 and 1-1 the results with increasing amounts of neutral electrolyte, in this case sodium chloride, to total electrolyte concentrations of 0.001 N., 0.01 N., 0.1 N., 0.6 N., and N., respectively. At low concentrations of hydroxyl ion and high electrolyte concentrations in the bath, the difference between $[\text{OH}^-]_p$ and $[\text{OH}^-]_s$ has little practical significance.

The values of $[\text{OH}^-]_p$ that have been obtained for various dye bath conditions can now be used in eqn. (1) to calculate the concentration of ionised cellulose hydroxyl groups present in the fibre under the same conditions. The resulting values are shown graphically in Fig. 3 (viscose rayon) and Fig. 4 (cotton). The graphs naturally are similar to those of Fig. 1 and 2, i.e. the higher $[\text{OH}^-]_s$ the greater is $[\text{AO}^-]$, and the higher the total concentration of electrolyte in the bath the greater is $[\text{AO}^-]$ for any one $[\text{OH}^-]_s$. One marked difference is, however, obvious. At very high concentrations of alkali, $[\text{AO}^-]$ becomes a constant, equal to Q . This is because the theoretical treatment takes into account the ionisation of only one hydroxyl group per glucose residue, and at these concentrations of alkali the groups are fully ionised. If the equations had been extended to include the ionisation of a second hydroxyl group, with a higher pK , then $[\text{AO}^-]$ would have continued to increase to a new constant value, and similarly for the third hydroxyl group on the glucose residue. Since, however, the alkali concentrations that would have to be used are very high, it was not thought necessary to increase the complexity of the equations by such considerations.

Using the values of $[\text{OH}^-]_p$ and $[\text{AO}^-]$ that have been obtained, and assuming that $[\text{ACOO}^-]$ is a constant at these concentrations of $[\text{OH}^-]_p$, eqn. (6) can now be used to calculate the amount of hydroxyl ion which will be adsorbed from these

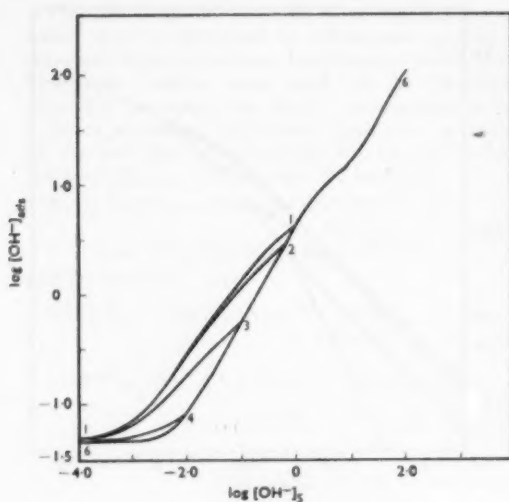


FIG. 5—Calculated amount of alkali adsorbed under various dye bath conditions (Viscose rayon)

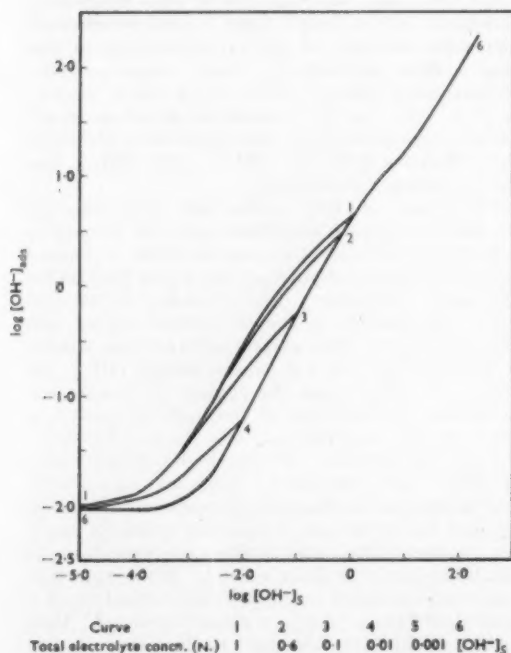


FIG. 6—Calculated amount of alkali adsorbed under various dye bath conditions (Cotton)

baths. The results of the calculation are shown graphically in Fig. 5 for viscose rayon and in Fig. 6 for cotton. For ease of calculation it was desirable to determine the value of $[\text{OH}^-]_s$ that would give a particular value of $[\text{OH}^-]_F$ and hence of $[\text{AO}^-]$, rather than to select $[\text{OH}^-]_s$ and calculate $[\text{OH}^-]_F$. Fig. 5 and 6 show that the calculated values follow the expected pattern, the amount of hydroxyl ion

adsorbed increasing as $[\text{OH}^-]_s$ increases; the higher the total electrolyte concentration, the greater is the amount adsorbed for any given value of $[\text{OH}^-]_s$. The curves are flattened at low values of $[\text{OH}^-]_s$ because the concentrations of ionised cellulose hydroxyl groups and OH^-_F are negligibly small compared with the concentration of cellulose carboxyl groups, which have been assumed to be fully ionised at these concentrations of alkali. Hence the curve tends to a constant value equal to that of $[\text{ACOO}^-]$.

So far only calculated results have been discussed, and it is now necessary to see if the theoretical treatment has any practical significance. The most direct method is to compare the predicted amount of hydroxyl ion adsorbed with the quantity actually adsorbed. This has been done for viscose rayon from baths containing only sodium hydroxide, using the methods described in the Experimental section; the results are shown in Fig. 7. They are from three sources, and the

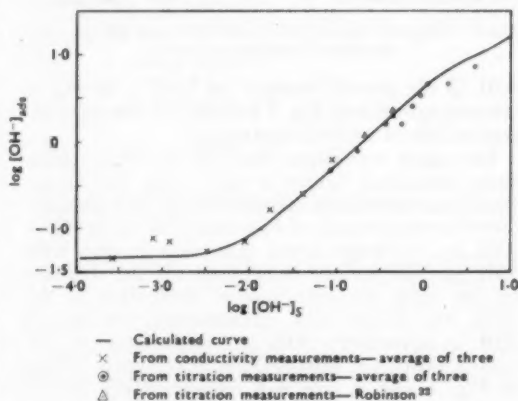


FIG. 7—Comparison of calculated and measured $[\text{OH}^-]_{\text{ads}}$ (Viscose rayon)

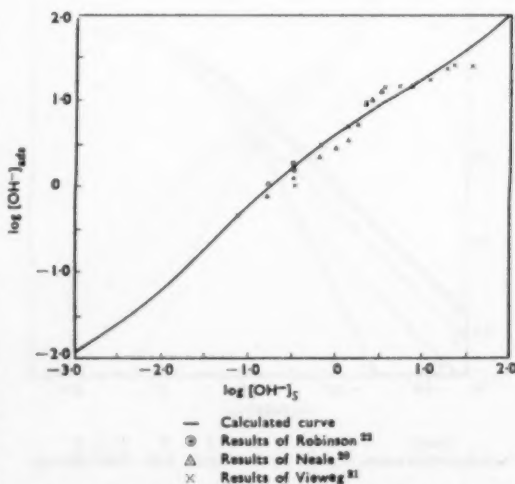


FIG. 8—Comparison of calculated and measured $[\text{OH}^-]_{\text{ads}}$ (Cotton)

measure of agreement between predicted and experimental values is good.

Fig. 8 shows a similar graph for cotton: no new experimental work was carried out, but results obtained by three workers²⁰⁻²² on different types of cotton show good agreement with theory. It would appear, therefore, that the adsorption of hydroxyl ion by cellulose can be successfully predicted from this theoretical treatment.

A further test is to investigate how well the method accounts for the marked fall in substantivity of a water-soluble dye applied to cellulose from dyebaths of increasing concentration of alkali. This effect is illustrated in Table II, where the amount of dye adsorbed by viscose rayon at room temperature (D_F) is listed against the pH of the bath. All the baths were of very large liquor ratio and had the same concentration of dye and electrolyte. The decrease in the amount of dye taken up by the cellulose as pH increases is assumed to be due to increasing competition by the hydroxyl ion, which, like the dye, is negatively charged. By using these results in eqn. (7), it is possible to calculate the affinity of the dye for cellulose at any pH.

$$\text{Affinity} = -\Delta\mu_0 = 2.303 RT \log \frac{[\text{Na}^+]_F^2 [\text{D}^{2-}]_F}{[\text{Na}^+]_S^2 [\text{D}^{2-}]_S} \dots (7)$$

By definition, the calculated affinity should be constant for all dyebath conditions at any one temperature and, if all other factors are constant, the constancy achieved is a direct indication of the accuracy of the method of calculating $[\text{Na}^+]_F$, since $[\text{D}^{2-}]_F$ and $[\text{D}^{2-}]_S$ are measured quantities and $[\text{Na}^+]_S$ is known from the composition of the dyebath.

Attempts have been made by Fowler, Michie, and Vickerstaff²³ and by Peters and Simons²⁴ to calculate affinities from alkaline dyebaths. In both cases $[\text{Na}^+]_F$ was calculated by assuming that a Donnan equilibrium existed between the aqueous and cellulose phases and that a condition of electrical neutrality applied to the cellulose phase. Fowler *et al.*²³, however, replaced all the anions in the bath in their theoretical treatment by an equivalent quantity of chloride ion. In this way they ignored any adsorption of hydroxyl ion by the cellulose and also the presence of ionised

carboxyl groups in the fibre. Their equation for electrical neutrality was therefore

$$[\text{Na}^+]_F = [\text{Cl}^-]_F + z[\text{D}^{2-}]_F$$

which gave

$$[\text{Na}^+]_F = [\text{D}^{2-}]_F \left(\frac{z}{2} + \left(\frac{z^2}{4} + \frac{[\text{Na}^+]_S [\text{eq Cl}^-]_S}{[\text{D}^{2-}]_S^2} \right)^{1/2} \right) \dots (8)$$

where

$$[\text{eq Cl}^-]_S = [\text{Cl}^-]_S + [\text{OH}^-]_S + z[\text{D}^{2-}]_S + x[\text{I}^{x-}]$$

and $[\text{I}^{x-}]$ = concentration of other ions of valency x . The consequences of these omissions were small, presumably because the concentration of sodium hydroxide in the bath was constant for all the experiments, and the result was a constant affinity. If this method of calculation is applied to the results given in Table II, the affinity decreases as the alkalinity increases (Table II, col. 4).

Peters and Simons took into account adsorption of hydroxyl ions by the cellulose, assuming that they had an affinity for the fibre which was independent of the dye present. The presence of these ions alters the charge conditions in the cellulose phase, so that the equation for electrical neutrality now becomes

$$[\text{Na}^+]_F = [\text{OH}^-]_F + [\text{Cl}^-]_F + z[\text{D}^{2-}]_F$$

which gives

$$[\text{Na}^+]_F = [\text{D}^{2-}]_F \left(\frac{z}{2} + \left(\frac{z^2}{4} + \frac{[\text{Na}^+]_S ([\text{eq Cl}^-]_S + K[\text{OH}^-]_S)}{[\text{D}^{2-}]_S^2} \right)^{1/2} \right) \dots (9)$$

where

$$[\text{eq Cl}^-]_S = [\text{Cl}^-]_S + x[\text{I}^{x-}]$$

and

$$K = \exp(-\Delta\mu_{0\text{NaOH}}/RT) = 10$$

Again the presence of ionised carboxyl groups in the fibre was ignored.

If this method of calculation is now applied to the results in Table II, the affinity still decreases markedly at higher concentrations of alkali (Table II, col. 5). It must be pointed out that increasing the value of K does tend to make the calculated affinity more nearly constant, but the value required, approximately 25, seems to be excessively large for the affinity (-1900 cal./mole) of such a simple ion as the hydroxyl ion, particularly when other ions (such as Cl^-) are always

TABLE II
Effect of pH on Substantivity and Results of Calculating Affinity by Different Methods

pH	Dye used:		Affinity ($-\text{kcal.}$) calculated by method of		
	D_S mole/l. $\times 10^4$	D_F mole/l. $\times 10^3$	Fowler <i>et al.</i> ²³	Peters and Simons ²⁴	present paper
7.0	1.29	14.1	2.78	2.78	2.83
8.0	1.20	13.8	2.81	2.81	2.86
9.5	1.19	13.9	2.82	2.82	2.87
11.0	1.19	12.9	2.77	2.78	2.85
11.9	1.27	8.90	2.51	2.61	2.79
12.6	1.31	4.55	2.09	2.45	2.83
12.7	1.30	4.06	2.02	2.45	2.85

assumed to have negligible affinity. Furthermore, such an assumption of constant affinity for the hydroxyl ion would not predict an adsorption isotherm of the sigmoid shape shown in Fig. 7 and 8.

The last column in Table II shows an affinity which is constant for increasing concentration of alkali; this affinity was calculated on the basis of the present theory, namely, that hydroxyl ion is consumed by a process of neutralisation. In this case $[Na^+]_F$ was calculated from eqn. (5a), which takes into account not only the carboxyl groups in the fibre, but also the dye. The constancy of the affinity calculated in this way is very good evidence that this treatment can successfully predict the effect of alkaline dyeing conditions on dye substantivity.

It is of interest to indicate how the three methods already discussed apply to dyeing from neutral solution. Here $[OH^-]_S$ is negligibly small and eqn. (9) [Peters and Simons] is therefore identical with eqn. (8) [Fowler, Michie, and Vickerstaff]. Under the same dyebath conditions, eqn. (5a) reduces to

$$[Na^+]_F = ([ACOO^-] + z[D^{2-}]_F) \left\{ \frac{1}{2} + \left(\frac{1}{4} + \frac{[Na^+]_S [eq Cl^-]_S}{([ACOO^-] + z[D^{2-}]_F)^2} \right)^{1/2} \right\} \quad (10)$$

where

$$[eq Cl^-]_S = [Cl^-]_S + z[D^{2-}]_S + x[I^{2-}]$$

which is almost identical with eqn. (8) but includes the concentration of carboxyl group present in the fibre. The inclusion of this term has marked effects on the calculated values of affinities from neutral solution, and this will be discussed further in a later paper of this series.²⁵

The remaining evidence available to substantiate the neutralisation mechanism concerns the mechanism of dyeing with reactive dyes.

It has been shown²⁵ both with soluble organic compounds containing hydroxyl groups and with cellulose, that the only satisfactory mechanism involves reaction between the dichloro-*s*-triazine dye and the ionised hydroxyl groups present. This result provides excellent proof that the theoretical

treatment is soundly based and hence that alkali is adsorbed by cellulose by a process of neutralisation.

Conclusions

The success of this approach in predicting the amount of hydroxyl ion which is adsorbed by both viscose rayon and cotton suggests that the theoretical treatment is a valid one and that the values of the various constants used, namely, availability of sites in cellulose, the V term, and the ionisation constant of the hydroxyl group in cellulose are substantially correct. Moreover, the fact that agreement is achieved over a wide range of concentrations of alkali indicates that the availability and the V term are not significantly changed by increasing the pH.

The above agreement between calculated and experimental results, together with the completeness with which the treatment accounts for

the loss in dye substantivity as the alkali concentration increases, is very strong evidence that the apparent sorption of hydroxyl ions is a neutralisation with the formation of ionised cellulose hydroxyl groups.

The conclusive proof that neutralisation is the true mechanism is provided by the work on the reactive dyes. When the concentration of ionised cellulose hydroxyl groups is calculated for a range of alkali concentrations and then used to evaluate the bimolecular rate constants for reaction between dye and cellulose, the results are in complete agreement with those for soluble hydroxyl-containing compounds, whose properties as weak acids are fully accepted.

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The Editor does not hold himself responsible for opinions expressed by correspondents

The English Contribution to the Early History of Indigo Printing

I should like to comment on a statement made by the late Peter Floud in his most interesting articles in the *Journal*. I had the pleasure of reading the first drafts of his articles, but I am unable to recall one particular sentence from the paper which appeared in the June issue; in the second column on p. 346 it is stated that "The first printable indigo—called in England 'pencil blue'—was achieved by adding orpiment (arsenic trisulphide) to the ferrous sulphate vat". No reference is given and I wonder if some new information has come to light, or if there has been some misinterpretation.

In order to assist future research workers, I think the following facts should be emphasised. The first detailed and dated recipe for "pencil blue", called at that time on the German-speaking Continent "Englischnblau", appears to be the one given by the famous Basle printer Jean Ryhiner in the year 1746. He bought it in 1745 from a German colour-maker; the correspondence is reproduced in *Bull. Soc. industr. Mulhouse*, **II**, 66 (1953). No copperas (ferrous sulphate) is mentioned, but orpiment, potash and lime are. The recipe was still used by the buyer in 1766.

I think, therefore, that until we obtain a dated and detailed recipe of the first "pencil blue" made in England, we must consider the 1745 recipe the correct one for "Englischnblau", and in this ferrous sulphate is not used.

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FRANCE

12th August 1960

(Mrs. Barbara J. Morris, assistant to the late Mr. P. C. Floud, writes "I have searched through the late Peter Floud's notes and can find no reference on which the statement queried by M. Schwartz may have been based. I can only hope that the publication of M. Schwartz's letter may bring some further evidence to light and help to clarify the position".—EDITOR)

Change in Colour of Vat Dyes on Soaping

The change in colour of vat dyes on soaping was discussed by Wegmann in a very interesting paper¹ presented at the I.F.A.T.C.C. Congress held in London in 1959². In commenting on the papers on soaping of vat dyes that have been published since 1953, he omitted to mention our study³ of thioindigoid dyes, which has been abstracted in English and French⁴. I must express my regret that because of this he did not receive, on the one hand, some support of his own views and could not, on the other, reply to our criticism⁵ of his explanation of the colour change of 5,5',7,7'-tetrabromoindigo on soaping⁶, based on involved changes in polarity. From a recent study of vibrational and electronic spectra of indigo and its derivatives⁷, it is concluded that tetrahalogenoindigo forms

no intermolecular hydrogen bonds, presumably because of steric hindrance (the hydrogen atoms being shielded by the halogen atoms). I should very much appreciate having Dr. Wegmann's opinion on this conclusion and on our published work^{3,8}. In the latter we arrived at the same conclusions as Egerton and Galil⁹, namely, that *cis-trans* isomerisation may occur on soaping thioindigoid dyes.

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5th August 1960 (Received 5th September 1960)

¹ Wegmann, J., *J.S.D.C.*, **76**, 282 (1960).

² Abramova, N. I., *Khim. Prom.*, No. 2, 175 (1960).

³ Golomb, L. M., and Romanova, M. G., *Tekstil. prom.*, **18**, No. 11, 30 (Nov 1958).

⁴ *J.S.D.C.*, **75**, 329 (1959); *Teintex*, **24**, 451 (1959).

⁵ Golomb, L. M., *Khim. Nauka i Prom.*, **3**, 225 (1958); *J.S.D.C.*, **75**, 74 (1959).

⁶ Wegmann, J., *Textil-Rund.*, **8**, 4, 97, 157 (1953).

⁷ Shigorin, D. I., Dokunilichin, N. S., and Gribova, E. A., *Zhur. fiz. khim.*, **29**, 867 (1955); *Chem. Abs.*, **51**, 858 (1957).

⁸ Golomb, L. M., and Romanova, M. G., *Tekstil. prom.*, **20**, No. 1, 56 (Jan 1960).

⁹ Egerton, G. S., and Galil, F., *Nature*, **181**, 1399 (1958).

The abstract⁴ of the paper by Golomb and Romanova³ mentions only the title: "Progress in Application of Vat Dyes in Dyeing and Printing". From this I could hardly deduce that colour changes on soaping were discussed. Unfortunately, this paper³ and the other two studies^{5,8} are available to me at present only in the original Russian text, which I cannot read. Therefore, I have to restrict my comments to the remarks in Mr. Golomb's letter.

In the first publication⁶, I was mainly concerned with the establishment of a basis for the molecular theory of colour changes as opposed to the crystallisation theory. I discussed as the possible mechanism the existence of forms differing in polarity, transition to a less polar form giving rise to a hypsochromic shift and formation of a more polar form giving a bathochromic change.

I did not discuss more precise possibilities, e.g. whether *cis-trans* isomerism might sometimes be taking place, because I could not furnish any supporting experimental evidence; this and other possibilities of sterically different forms were in any case covered by the general theory.

For 5,5',7,7'-tetrabromoindigo I considered a change from the dipolar to the quadripolar structure, stabilised by intramolecular hydrogen bonds, to be responsible for the colour change from greenish blue to reddish blue. From the work of Wyman and his collaborators¹⁰, as well as that of Pummerer¹¹, I would assume a change from the dipolar, non-planar *cis*-form to the quadripolar *trans*-form, which must be coplanar. In fact, Wyman *et al.* have not only given proof for the existence of *cis-trans* isomerism in solutions of

thioindigo dyes, but also have shown that the non-planar *cis*-form is more polar than the *trans*-form. Pummerer, on the other hand, has shown that *cis*- and *trans*-isomers can also be found in certain indigoid derivatives. One contradictory point has, however, to be mentioned. In the case of the thioindigoid dyes, Wyman *et al.* attribute the yellow colour to the *cis*-form and the purple to the *trans*. On the other hand, soaping causes, in most cases, a hypsochromic shift, which would indicate a transition from the *trans*- to the less stable *cis*-form, which seems unlikely.

Whether indigoid dyes form hydrogen bonds is still an open question, but for the mechanism of the colour changes this is of secondary importance. The contention that steric hindrance does not allow such bonds to be formed is, in my opinion, not valid for intramolecular bonds. Important differences must exist between different indigoid dyes, because the maximum in the absorption spectra of some dyes is at the same wavelength whether the dye is in the solid state, in solution or on fibres, whereas this is not so for other indigoid dyes.

I look forward with great interest to the confirmation of Egerton's^{2,12} conclusions and I also hope to have the opportunity soon of studying Golomb's papers.

J. WELSMAN

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compounds containing hydroxyl groups and with cellulose, that the only satisfactory mechanism involves reaction between the dichloro-*s*-triazine dye and the ionised hydroxyl groups present. This result provides excellent proof that the theoretical

nearly all the dye present at the end of the dyeing must still have been in the form of a dispersion of solid particles. Under such conditions it is impossible to measure the affinity.

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5th August 1960

- ¹ Bird, C. L., and Harris, P., *J.S.D.C.*, **73**, 201 (1957).
² Fortes, F., and Salvia, V. S., *Text. Research J.*, **28**, 1009 (1958).
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The low values of partition coefficients and affinities of certain quinonoid disperse dyes obtained by Daruwalla, Rao, and Tilak³ have been attributed by Bird to the highly insoluble nature of these dyes and the consequent possibility of most of the dye remaining in the bath in the form of a dispersion of solid particles. We disagree with this view, since no correlation has been observed between the solubility of these dyes in water and the partition ratio between the acetate and aqueous phases. Some of these dyes, e.g. dyes V and VI (owing to the presence of hydrophilic -CH₂OH groups) and dyes IX and X (on account of their ionic nature) show very high solubility in water at the temperature of dyeing

fully accepted.

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¹³ Souchay, P., and Schaal, R., *Bull. Soc. Chim. France*, **819** (1950).
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¹⁷ Sharples, A., *Trans. Faraday Soc.*, **54**, 913 (1958).
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Effect of Fluorescent Brightening Agents on the Light Fastness of Dyed Cellulose

Fluorescent brightening agents¹ (FBA) would be expected to retard dye fading, because of their strong absorption of ultraviolet radiation, which is partly responsible for fading². Apparently no detailed account of their effects on light fastness has previously been published, and statements on qualitative effects in dye fading on textiles are conflicting³, though these agents are apparently useful in retarding colour fading in photographs⁴ and plastic materials⁵. The present work was carried out to examine quantitatively their effects on the light fastness of dyed cellulose.

Experiments⁶ on Cellophane film showed that:

(a) The FBA retards fading, when either in the dyed film or in a separate layer, in short-wave illumination, but not in green or yellow light. Thus the action is due to screening of short-wave radiation.

(b) Even when the FBA is in the dyed film, the slope of the CF (characteristic fading) curve is not significantly altered. This means that the physical state of the dye is little affected⁷.

(c) The effects are not significant by commercial standards. Even with excess of agent (> 1%), fastness is improved by < 1 unit (i.e. reduction in fading rate of < 50%). With a normal quantity (0.48%) of agent the improvement is about one half grade (i.e. 30% retardation of

fastness is not usual).

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(Mrs. Barbara J. Morris, assistant to the late Mr. P. C. Floud, writes "I have searched through the late Peter Floud's notes and can find no reference on which the statement queried by M. Schwartz may have been based. I can only hope that the publication of M. Schwartz's letter may bring some further evidence to light and help to clarify the position".—EDIRON)

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Finally, light-fading tests were made by the normal method against the B.S.I. standards on a series of viscose rayon fabrics dyed in medium depth with the following dyes of different light fastnesses: C.I. Direct Yellows 8, 12; Reds 2, 23, 75, 80; Blues 1, 8, 66; Greens 8, 28; Vat Yellow 26; Orange 5, each (a) untreated and (b) aftertreated with three FBA (0.1% of each), also of different light fastness (C.I. Fluorescent Brightening Agents 15, 17, 18).

Exposures made until standard 4 faded showed that, with two exceptions, no notable change in fastness had been produced by the agents. In a few cases a slight improvement (< 1 grade) and in others a slight deterioration was noticed, in the early stages of fading only. The two exceptions were direct red dyes: C.I. Direct Red 2, which in all cases considerably deteriorated in fastness, and C.I. Direct Red 23, which deteriorated after treatment with two agents.

It was also noticed that some of the treated patterns fluoresced brightly under ultraviolet radiation, whereas others did not; some dyes appear to quench the fluorescence of the agents. A recent investigation by Hayashi⁸ showed that there is a "critical quenching concentration" of agent in cellulose above which changes occur in its state of aggregation, light fading rate, and fluorescence.

It appears that these agents are unlikely to be of practical value for improving the light fastness

changes on soaping were discussed. Unfortunately, this paper³ and the other two studies^{6,8} are available to me at present only in the original Russian text, which I cannot read. Therefore, I have to restrict my comments to the remarks in Mr. Golomb's letter.

In the first publication⁶, I was mainly concerned with the establishment of a basis for the molecular theory of colour changes as opposed to the crystallisation theory. I discussed as the possible mechanism the existence of forms differing in polarity, transition to a less polar form giving rise to a hypsochromic shift and formation of a more polar form giving a bathochromic change.

I did not discuss more precise possibilities, e.g. whether *cis-trans* isomerism might sometimes be taking place, because I could not furnish any supporting experimental evidence; this and other possibilities of sterically different forms were in any case covered by the general theory.

For 5,5',7,7'-tetrabromoindigo I considered a change from the dipolar to the quadrupolar structure, stabilised by intramolecular hydrogen bonds, to be responsible for the colour change from greenish blue to reddish blue. From the work of Wyman and his collaborators⁹, as well as that of Pummerer¹¹, I would assume a change from the dipolar, non-planar *cis*-form to the quadrupolar *trans*-form, which must be coplanar. In fact, Wyman *et al.* have not only given proof for the existence of *cis-trans* isomerism in solutions of

thioindigo dyes, but also have shown that the non-planar *cis*-form is more polar than the *trans*-form. Pummerer, on the other hand, has shown that *cis*- and *trans*-isomers can also be found in certain indigoid derivatives. One contradictory point has, however, to be mentioned. In the case of the thioindigoid dyes, Wyman *et al.* attribute the yellow colour to the *cis*-form and the purple to the *trans*. On the other hand, soaping causes, in most cases, a hypsochromic shift, which would indicate a transition from the *trans*- to the less stable *cis*-form, which seems unlikely.

Whether indigoid dyes form hydrogen bonds is still an open question, but for the mechanism of the colour changes this is of secondary importance. The contention that steric hindrance does not allow such bonds to be formed is, in my opinion, not valid for intramolecular bonds. Important differences must exist between different indigoid dyes, because the maximum in the absorption spectra of some dyes is at the same wavelength whether the dye is in the solid state, in solution or on fibres, whereas this is not so for other indigoid dyes.

I look forward with great interest to the confirmation of Egerton's^{9,12} conclusions and I also hope to have the opportunity soon of studying Golomb's papers.

J. WEGMANN

TOMS RIVER-CINCINNATI CHEMICAL CORPN.
TOMS RIVER
NEW JERSEY
U.S.A.

22nd September 1960

¹⁻³ See Golomb, L. M., previous page.

¹⁰ Wyman, G. M., and Brode, W. R., *J. Amer. Chem. Soc.*, **73**, 1487 (1951); Brode, W. R., Pearson, E. G., and Wyman, G. M., *ibid.*, **76**, 1034 (1954); Weinstein, T., and Wyman, G. M., *ibid.*, **78**, 2387 (1956); Rogers, D. A., Margerum, T. D., and Wyman, G. M., *ibid.*, **79**, 2464 (1957).

¹¹ Pummerer, R., and Marondel, G., *Ann.*, **602**, 228 (1957).

¹² Egerton, G. S., *Nature*, **183**, 389 (1959).

The Affinity of Disperse Dyes for Cellulose Acetate

The affinity of disperse dyes for cellulose acetate is calculated from reversible-equilibrium sorption values below saturation of the fibre, which may be determined by means of adsorption or desorption experiments. The danger of relying on adsorption, i.e. on long-period dyeings, has been pointed out previously¹. Some disperse dyes, in particular anthraquinonoid dyes, never reach true equilibrium as indicated by the presence of dyed fibre in equilibrium with an optically clear solution of dye. Instead of becoming gradually smaller and ultimately dissolving in the normal way, some of the crystalline particles in the dispersion grow in size and are never adsorbed by the fibre, a false equilibrium being established². Hence it is advisable to determine equilibrium values by means of desorption of dyed yarn in water.

In a recent paper by Daruwalla, Rao, and Tilak³, partition coefficients as low as 2-3 are recorded for two of the dyes used, corresponding to an exhaustion of 2-3%. Unless the dyes were exceptionally soluble (at 80°C.)—their chemical formulae suggest that they were highly insoluble—

nearly all the dye present at the end of the dyeing must still have been in the form of a dispersion of solid particles. Under such conditions it is impossible to measure the affinity.

C. L. BIRD

DEPARTMENT OF COLOUR CHEMISTRY AND DYEING
THE UNIVERSITY
LEEDS 2

5th August 1960

¹ Bird, C. L., and Harris, P., *J.S.D.C.*, **73**, 201 (1957).

² Fortess, F., and Salvin, V. S., *Text. Research J.*, **28**, 1009 (1958).

³ Daruwalla, E. H., Rao, S. S., and Tilak, B. D., *J.S.D.C.*, **76**, 418 (1960).

The low values of partition coefficients and affinities of certain quinonoid disperse dyes obtained by Daruwalla, Rao, and Tilak³ have been attributed by Bird to the highly insoluble nature of these dyes and the consequent possibility of most of the dye remaining in the bath in the form of a dispersion of solid particles. We disagree with this view, since no correlation has been observed between the solubility of these dyes in water and the partition ratio between the acetate and aqueous phases. Some of these dyes, e.g. dyes V and VI (owing to the presence of hydrophilic -CH₂OH groups) and dyes IX and X (on account of their ionic nature) show very high solubility in water at the temperature of dyeing (80°C.). With practically all the pairs of coplanar and corresponding non-coplanar dyes, there is no difference in aqueous solubility and therefore the low affinities of the non-coplanar dyes can only be attributed to their structural characteristics.

With regard to the advisability of determining equilibrium values by means of desorption, most of the work on the application of disperse dyes to secondary cellulose acetate⁴, triacetate⁵ and polyester⁶ fibres has shown that adsorption and desorption isotherms are identical. It was not possible in the present work to reach equilibrium with the dyes of low partition coefficients by desorption, because the amount of dye that could be transferred to the acetate was so small that sufficient accuracy could not be achieved. No thermodynamic importance should be attached to the actual values of affinity of disperse dyes for acetate because of the uncertainty of the activity values for these dyes in solution and in the fibre, and also because changes in the fibre structure are likely to take place during dyeing. The values obtained should therefore only be used to compare a coplanar dye with its corresponding non-coplanar analogue under similar conditions of application.

E. H. DARUWALLA
S. S. RAO
B. D. TILAK

DEPARTMENT OF CHEMICAL TECHNOLOGY
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BOMBAY 19
INDIA

3rd October 1960

¹⁻³ Bird, above.

⁴ Daruwalla and Limaye, *ibid.*, **74**, 464 (1958).

⁵ Daruwalla and Kundalia, forthcoming publication.

⁶ Schuler and Remington, *Disc. Faraday Soc.*, **16**, 201 (1954).

Effect of Fluorescent Brightening Agents on the Light Fastness of Dyed Cellulose

Fluorescent brightening agents¹ (FBA) would be expected to retard dye fading, because of their strong absorption of ultraviolet radiation, which is partly responsible for fading². Apparently no detailed account of their effects on light fastness has previously been published, and statements on qualitative effects in dye fading on textiles are conflicting³, though these agents are apparently useful in retarding colour fading in photographs⁴ and plastic materials⁵. The present work was carried out to examine quantitatively their effects on the light fastness of dyed cellulose.

Experiments⁶ on Cellophane film showed that:

(a) The FBA retards fading, when either in the dyed film or in a separate layer, in short-wave illumination, but not in green or yellow light. Thus the action is due to screening of short-wave radiation.

(b) Even when the FBA is in the dyed film, the slope of the CF (characteristic fading) curve is not significantly altered. This means that the physical state of the dye is little affected⁷.

(c) The effects are not significant by commercial standards. Even with excess of agent (> 1%), fastness is improved by < 1 unit (i.e. reduction in fading rate of < 50%). With a normal quantity (0.08%) of agent the improvement is about one half-grade (ca. 30% retardation of rate).

Complications occur on fabrics which may still further reduce the effectiveness of the FBA:

(1) Too rapid fading of the agent will reduce its effectiveness.

(2) Too slow fading will also reduce its effectiveness, for the following reason. The fluorescence of the agent normally makes the dyed shade appear weaker and brighter; this effect increases as the proportion of agent rises. Therefore, if the agent fades more slowly than the dye, the weakening effect becomes more noticeable. This will mask, and even reverse, the improvement in fastness due to the dye's reduced fading rate.

(3) The colour of the fading products of the agent may mask any improvement in fastness.

In confirmation of (2) it was found that Photine C faded at about one-quarter of the rate of C.I. Direct Blue 1 in Cellophane, and on viscose rayon it caused a slight apparent reduction in fastness of the dye, when measured spectrophotometrically by reflectance.

Finally, light-fading tests were made by the normal method against the B.S.I. standards on a series of viscose rayon fabrics dyed in medium depth with the following dyes of different light fastnesses: C.I. Direct Yellows 8, 12; Reds 2, 23, 75, 80; Blues 1, 8, 66; Greens 8, 28; Vat Yellow 26; Orange 5, each (a) untreated and (b) aftertreated with three FBA (0.1% of each), also of different light fastness (C.I. Fluorescent Brightening Agents 15, 17, 18).

Exposures made until standard 4 faded showed that, with two exceptions, no notable change in fastness had been produced by the agents. In a few cases a slight improvement (< 1 grade) and in others a slight deterioration was noticed, in the early stages of fading only. The two exceptions were direct red dyes: C.I. Direct Red 2, which in all cases considerably deteriorated in fastness, and C.I. Direct Red 23, which deteriorated after treatment with two agents.

It was also noticed that some of the treated patterns fluoresced brightly under ultraviolet radiation, whereas others did not: some dyes appear to quench the fluorescence of the agents. A recent investigation by Hayashi⁸ showed that there is a "critical quenching concentration" of agent in cellulose above which changes occur in its state of aggregation, light fading rate, and fluorescence.

It appears that these agents are unlikely to be of practical value for improving the light fastness of dyed textiles.

Thanks are due to Mr. D. J. Stamp and Hickson & Welch Ltd. for making the standard fading tests on fabrics.

C. H. GILES

S. M. K. RAHMAN

COLOUR CHEMISTRY RESEARCH LABORATORY
DEPARTMENT OF CHEMICAL TECHNOLOGY
ROYAL COLLEGE OF SCIENCE AND TECHNOLOGY
GLASGOW, C.1

12th August 1960

¹ For a full account, see Adams, *J.S.D.C.*, **75**, 22 (1959).

² McLaren, *ibid.*, **72**, 86 (1956).

³ See, e.g., Gantz and Sumner, *Dyer*, **118**, 410 (1957); Textile Institute, London Section, Discussion on colour fastness, *ibid.*, **117**, 280 (1957).

⁴ Agfa, BP 779,223; ICI, BP 783,325.

⁵ Bradley, *Ind. Eng. Chem.*, **46**, 15A (1954).

⁶ Made by methods described elsewhere, e.g., Campbell and Giles, *J.S.D.C.*, **74**, 164 (1958).

⁷ Giles, *ibid.*, **73**, 127 (1957).

⁸ Hayashi, *J. Chem. Soc. Japan, Ind. Chem. Sect.*, **63**, 118 (1960).

Notes

Election of Associates

At the meeting of Council held on 2nd November 1960 the following, having passed the prescribed examination, were elected Associates of the Society—

Kenneth Alan Bagley

Somercotes, Derbys.; Textile Technologist, Stevensons (Dyers) Ltd, Ambergate

Anthony John Baker

Donaghmore, Co. Tyrone; Development Chemist, Stevenson & Son Ltd, Dungannon

Brian Bennett

Bradford, Yorks.; Assistant Dyer, Blamires Ltd, Huddersfield

James Ernest Blavins

Derby; Assistant to Chief Colourist, Courtaulds Ltd, Spondon

Bernard Charnley

Buxton, Derbys.; Development Chemist, William Tatton & Co. Ltd, Leek, Staffs.

Zouhair S. Debs

Damascus, Syria; Assistant Dyehouse Manager, United Arab Industrial Corp'n, Damascus

Joseph Devey

Paisley, Scotland; Dyer, J. & J. McCallum Ltd

Abd-El-Khalik El-Awad

Mehalla Kubra, Egypt; Chief Dyer, Misr-Company

Derek Alan Ferguson

Droylsden, Lancs.; Laboratory Assistant, Imperial Chemical Industries Ltd, Blackley, Manchester

Stanley Finlay

Ballymena, Co. Antrim; Chemist, Ballievey Bleaching Co. Ltd, Banbridge, Co. Down

David John Garner

Marsh, Huddersfield; Chemist, L. B. Holliday & Co. Ltd

Ronald Steele Harding

Bradford, Yorks.; Dyer, Aykroyd & Grandage Ltd

Frederick Thomas Higgins

Nuthall, Notts.; Manager of Yarn Department, H. Ashwell & Co. Ltd, Nottingham

Wladyslaw Filip Luczynski

West Bridgford, Nottingham; Textile Chemist, Frymann & Fletcher Ltd

Alan Henry McKeand

Accrington, Lancs.; Development Chemist and Assistant Colourist, Calico Printers' Association Ltd

Anthony Charles Pitman

West Bridgford, Nottingham; Assistant Works Manager, Spray & Burgess Ltd

James Samuel Pittillo

Ravensthorpe, Dewsbury; Assistant Works Chemist, Jas. Smith & Sons (Cleaners) Ltd

Robert Sidlow

Bradford, Yorks.; Textile Chemist, Allied Colloids (Bradford) Ltd

Julius Victor Szolin

Nottingham; Textile Chemist, Murray Bros. & Co. Ltd

James Kenmure Mitchell Weir

Falkirk, Scotland; Assistant Technical Officer, Imperial Chemical Industries (Dyestuffs) Ltd, Grangemouth

John Malcolm Wilkinson

Bradford, Yorks.; Senior Laboratory Assistant, William North & Co. Ltd

Peter Wood

Batley, Yorks.; Dyer, Birstall Carpet Co. Ltd, Birstall, Yorks.

West Riding Section Junior Members' Competition

The Dyers' and Finishers' Association have donated the sum of 30 gns. to the Society for the 1960-61 competition for Junior Members resident in the West Riding. This will be awarded as prizes to the value of 15 gns., 10 gns., and 5 gns. for the three best essays submitted.

Essays are invited on any one of the following subjects—(1) the development of the application of anionic dyes to wool, (2) the methods developed for shrink resisting wool, (3) the development of dyes for cellulose acetate and their use on this fibre and on other hydrophobic fibres, (4) the development of the reactive dyes and their application to natural fibres, (5) the classification of direct dyes and its practical importance.

Details of the competition rules, full subject titles, and entry forms can be obtained from Miss Esmée Smith, Flat 16, Foxhill, Weetwood Lane, Leeds 16. The closing date is 1st February 1961.

Perkin Centenary Trust

Applications for awards for the academic year 1961-2 should be made before 1st May 1961 on forms available from the Secretary of the Trust, c/o The Chemical Society, Burlington House, London W.1. The awards available are—

Perkin Centenary Fellowship—For 1 or 2 years' higher study of any approved subject. Candidates must have had experience in the manufacture or application of colouring matters or their intended field of study must have a direct bearing on these subjects. Value is £750 p.a., with grant of up to £100 p.a. towards certain designated expenses.

Perkin Centenary Scholarships (2)—For 2 years, possibly renewable for third year, to enable candidates employed in manufacture or application of colouring matters to study at university or technical college. Value is £350 p.a., possibly

increased to £400 if candidate has to live away from home.

Perkin Centenary Trust Travel Grants—Applications are invited from teachers concerned with study of colouring matters to enable them to gain experience at a similar institution or in industry overseas.

Plastics and Textiles

The Plastics Institute's Young People's Lecture, on "Plastics and Textiles," will be given by Dr. H. A. Thomas, F.R.I.C., F.T.I., F.S.D.C., on 2nd January 1961 at 2.30 p.m. in the Lecture Theatre of the Institution of Electrical Engineers, Savoy Place, London W.C.2. It is primarily intended for those between the ages of 15 and 18, although parents or teachers accompanying children may attend. Tickets are available from The Plastics Institute, 6 Mandeville Place, London W.1.

Physical Society Exhibition

The 45th Physical Society Exhibition of Scientific Instruments and Apparatus will be held at the Royal Horticultural Society's Halls at Westminster on 16th-20th January 1961. Tickets are available from the Institute of Physics and the Physical Society, 47 Belgrave Square, London S.W.1.

Meetings of Council and Committees November

Bristol Symposium Technical Papers Subcommittee—1st
Council—2nd
The Society of Dyers and Colourists Medals—2nd
Colour Index Editorial Board—4th
Finance and General Purposes—8th
Publications—15th
Disperse Dyes—16th
Light Fastness Subcommittee—18th

International Federation of Associations of Textile Chemists and Colourists

A meeting of the Council of Delegates of the Federation was held in Mulhouse on 22nd September 1960. The chair was taken by the President, Mr. John Boulton. All eight member nations of the Federation were represented by a total of 29 delegates. The minutes of the meeting held in Basle on 26th February 1960 were accepted, after which the main item on the agenda, the expansion and further development of the Federation, was discussed. The President had prepared a special memorandum on this subject which was circulated to the national presidents several weeks before the meeting.

Applications for membership had been received from the Polish and Bulgarian Associations, and

from the American Association of Textile Chemists and Colourists. This world-wide interest in the work of the Federation was warmly welcomed. The President believed that nothing should stand in the way of world-wide collaboration, and the I.F.A.T.C.C. had before it the task of initiating a world-wide organisation.

At the previous meeting, the delegates had agreed in principle to such an extension of the Federation's activities. It became evident, however, that the present organisation of the Federation needed revision in order to meet future requirements. The Federation should have more to offer to member organisations than a world congress every three years.

Delegates thought that difficulties might arise because some associations had statutes which differed from those of the present members. These could be adjusted. One of the problems to be tackled was that of the training and qualification of the members of all the individual national associations. The first step was the setting up of a Technical Committee; unfortunately, the preliminary work was progressing very slowly, owing to the many demands made on this committee's members by their professional duties.

A lively discussion ensued on the points raised by the President in his speech. Although the delegates were in general agreement, the difficulties which might arise were not overlooked. It would be conceivable either to develop the Federation, which is restricted at present to eight European

neighbour countries, into a world-wide organisation, or to incorporate the present Federation in a world organisation covering several geographical zones. There were, therefore, many points which needed clarification, but which could not be dealt with at plenary meetings of the Council of Delegates; it was therefore unanimously decided to set up a subcommittee to which each national association would delegate one member. The President, Vice-President, and Secretary of the Federation would also serve on this committee, which would meet as soon as possible to clarify matters and to submit proposals to the Council of Delegates.

After Monsieur Freytag had presented the Treasurer's report, the proceedings were closed.

M. PETER

Association des Chimistes de l'Industrie Textile (A.C.I.T.) 50th Anniversary Celebrations 24th September 1960

During the final business session, Mr. F. M. Stevenson said—

"Monsieur le Président, may I be permitted, as President of the Society of Dyers and Colourists, which has just celebrated its 75th Anniversary, to offer to you hearty congratulations on so successful a celebration of your 50th birthday. My Council wishes me to express its good wishes for your continued success, to thank you for the opportunity you have given to the English visitors to join you in your Congress, and to say we hope you will find occasion to visit us in England so that we may repay your hospitality.

We have been very impressed with the happy atmosphere prevailing in the Congress; we are keenly aware of the alertness and modernity of your industry, and we respect your international outlook. Some of you, I am pleased to say, are already members of our Society too; more of you read our *Journal* and make use of the *Colour Index*, so recently completed; we hope the exchange of views and visits may be fostered by both of us, and that we scientists and technicians may make our contribution to the progress of mankind and a better understanding between the nations.

Once more, Monsieur le Président, I give you our salutations."

OBITUARY NOTICES

Ernest A. Sack

Ernest Sack was born in 1890 at Moussey in the Vosges, France. After studying at the School of Chemistry in Mulhouse he did his military service and then went to Russia, where he was engaged in textile printing. He returned to France when war was declared and rejoined his regiment. During the war he was badly wounded, his exploits gaining him the award of the Croix de Guerre and the Légion d'Honneur.

After a period of convalescence he joined, in 1920, the Compagnie Nationale des Matières Colorantes, working in the technical service department, of which he soon became director. His qualities led to his appointment, in 1952, as Commercial Director; failing health compelled him to retire in 1954.

He had been a member of the Association des Chimistes de l'Industrie Textile since 1913; after the First World War he served on its administrative council, and from 1939 to 1947 was President of the Association. He died suddenly at Mulhouse on 23rd September 1960 whilst taking part in the jubilee celebrations of the Association. He is survived by his wife and children.

The following letter was sent by Mr. F. M. Stevenson, President of the Society, to Monsieur C. Zuber, Président de l'A.C.I.T., during the Congress—

"On behalf of all my English colleagues present at your Anniversary meeting, and on behalf of the Society of Dyers and Colourists, may I express to you, Monsieur le Président, our sincere sympathy and sense of the loss which your Society has sustained through the sudden death of Monsieur Sack.

The circumstances of his passing, in the act of playing an important part at the opening of your celebrations, gives added poignancy to the occasion. It may perhaps be said to be an event in keeping with his long life of service.

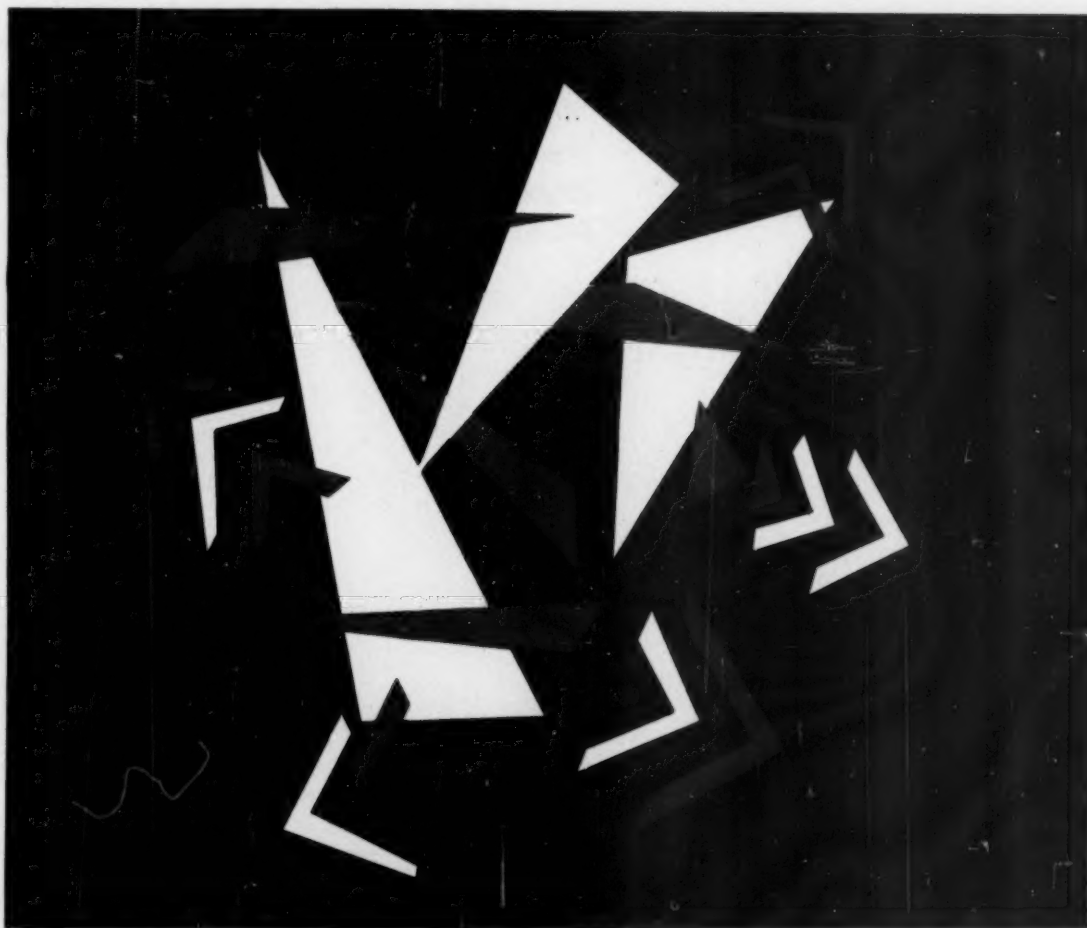
At your happy dinner on Thursday evening I had the special privilege and pleasure to be next to him, and I carry away exceptionally precious memories of his friendly and felicitous company.

His example of courage and fullness of living must be an inspiration to us all, despite the loss we feel."

Ernest Arthur Bearder

The death on July 22nd of Ernest Arthur Bearder, at the age of 73, breaks yet another link with those pioneers of the early part of the century, Professors A. G. Green and A. G. Perkin, under whom he trained at Leeds University.

Bearder served with Leinsteins from 1911 until 1921, when he was appointed adviser to the Dye-stuffs Advisory Licensing Committee of the Board



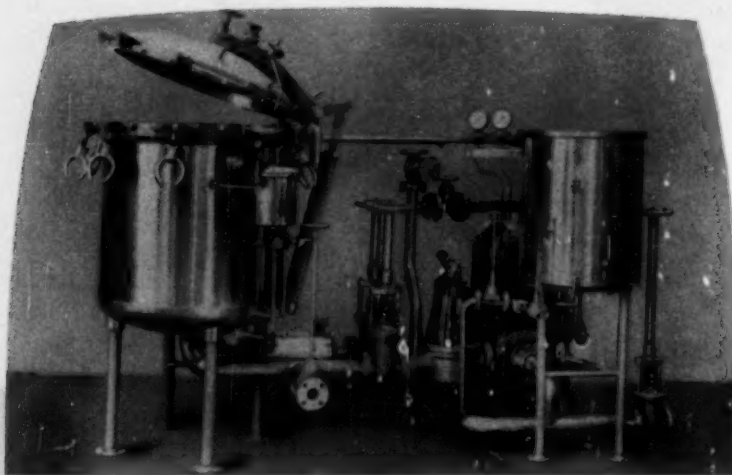
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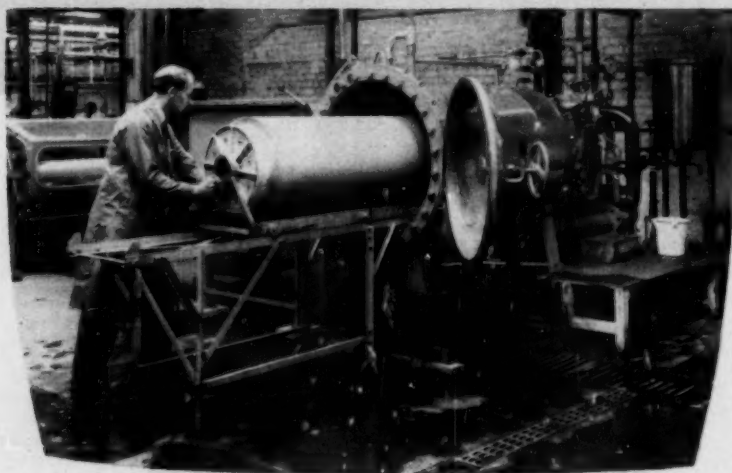
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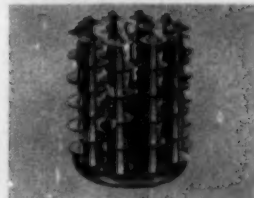
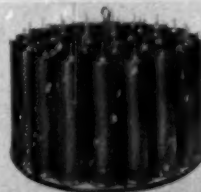


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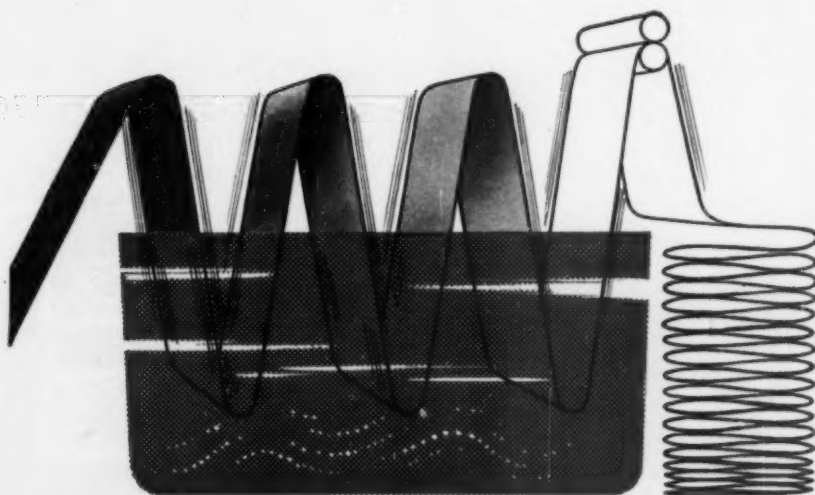
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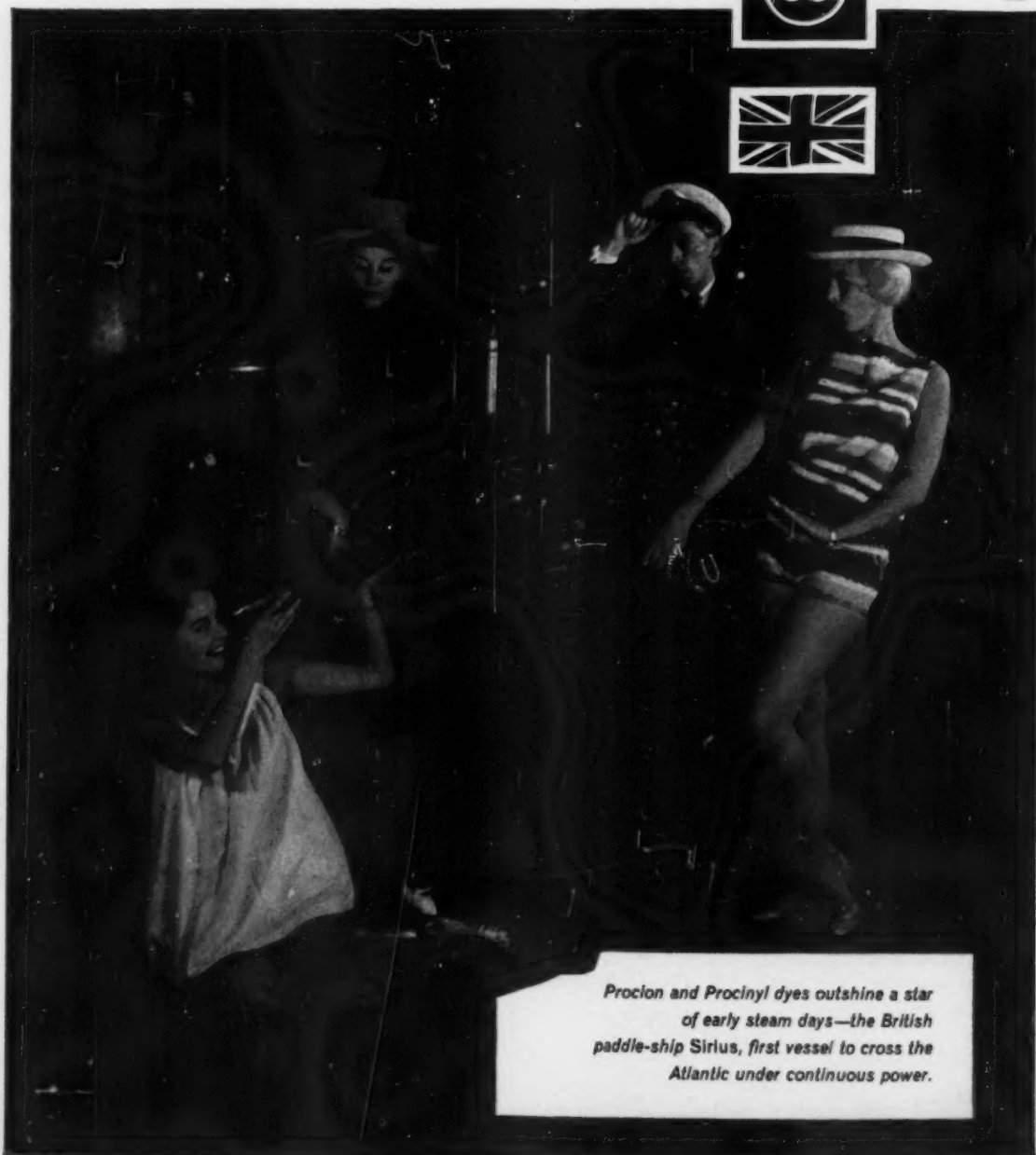
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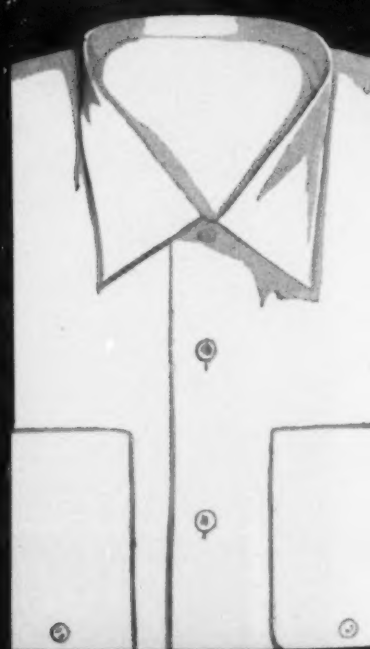


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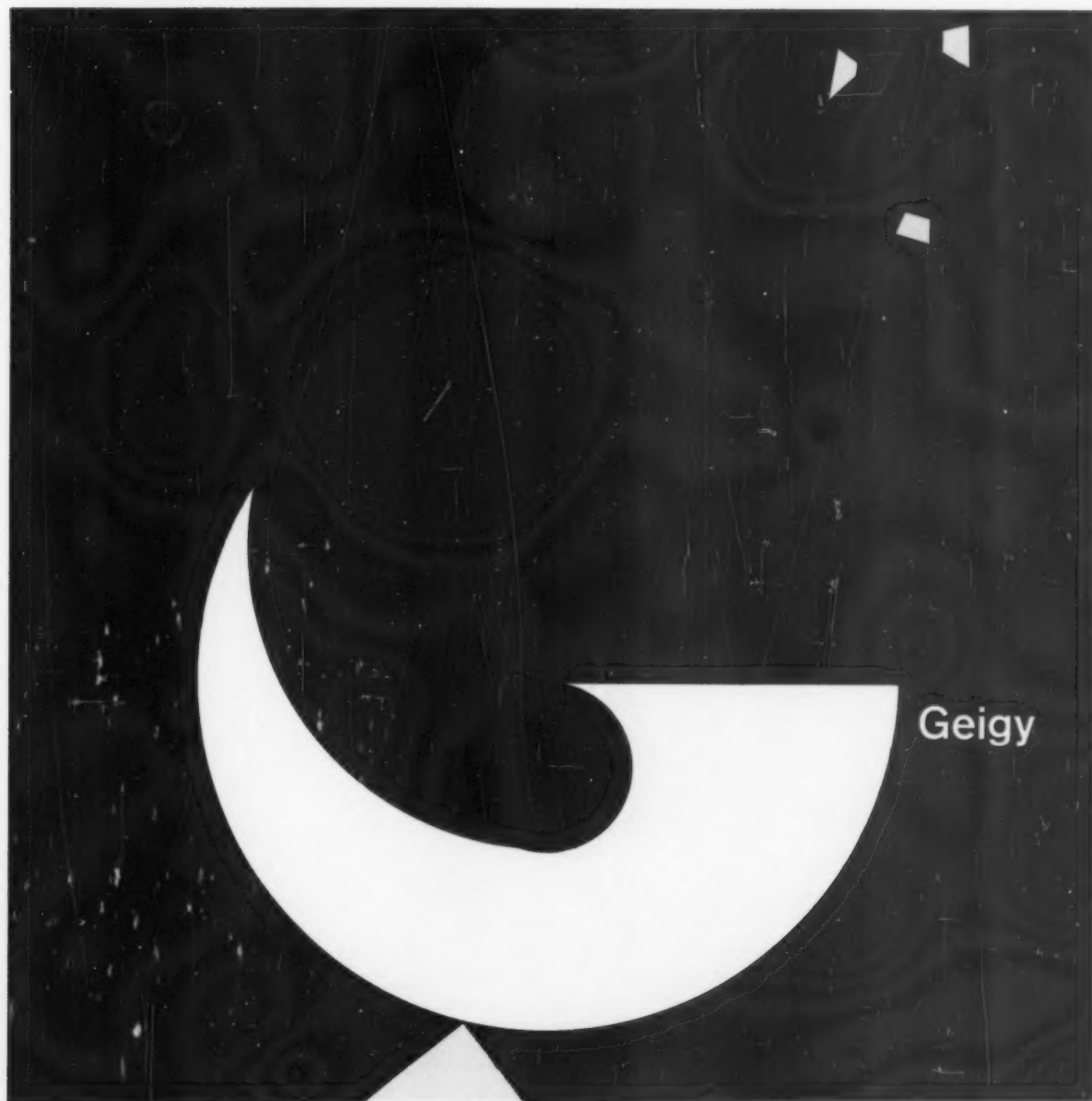


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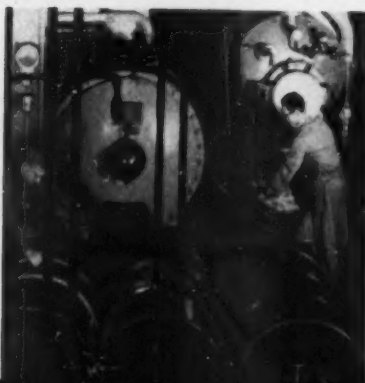
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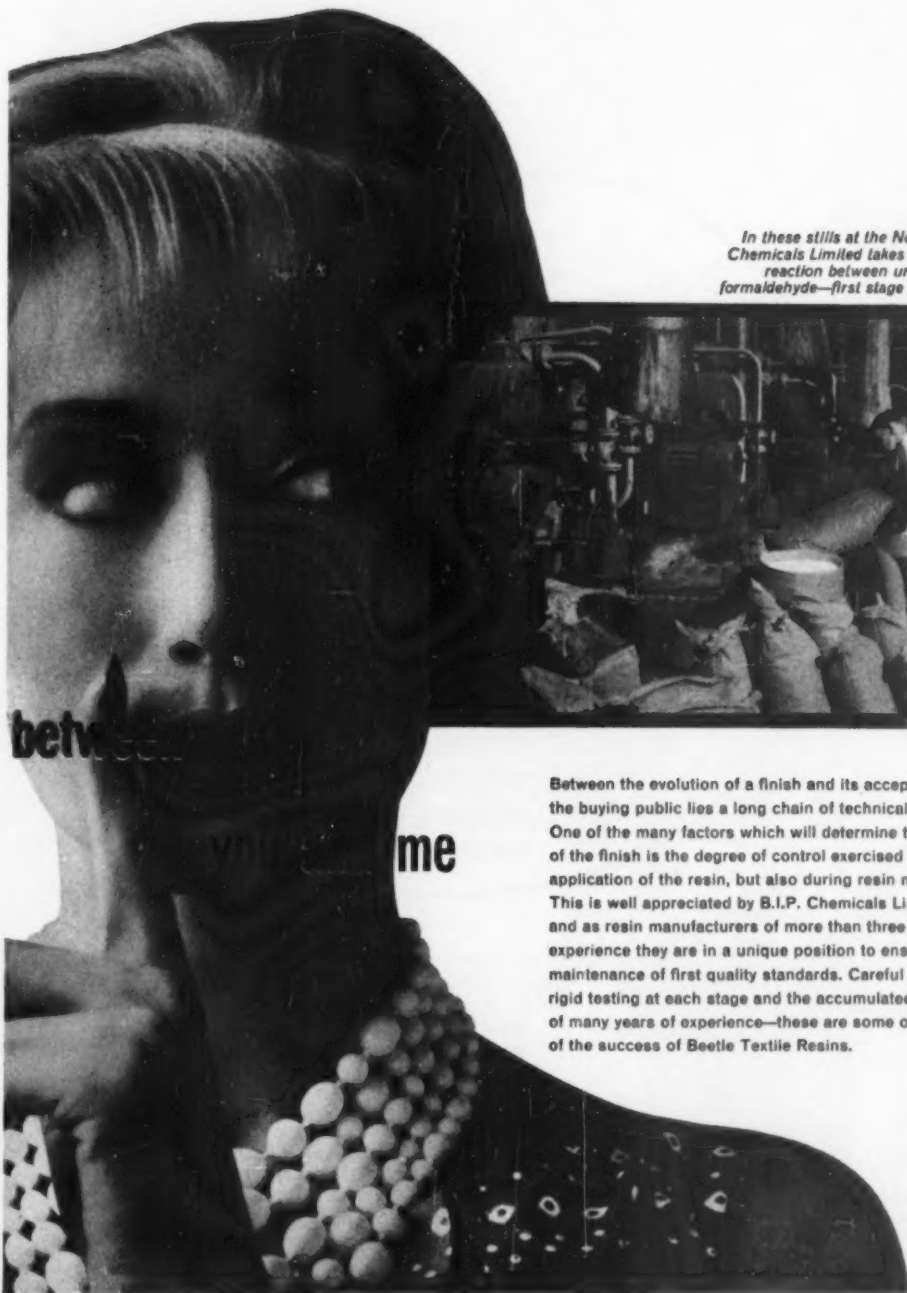
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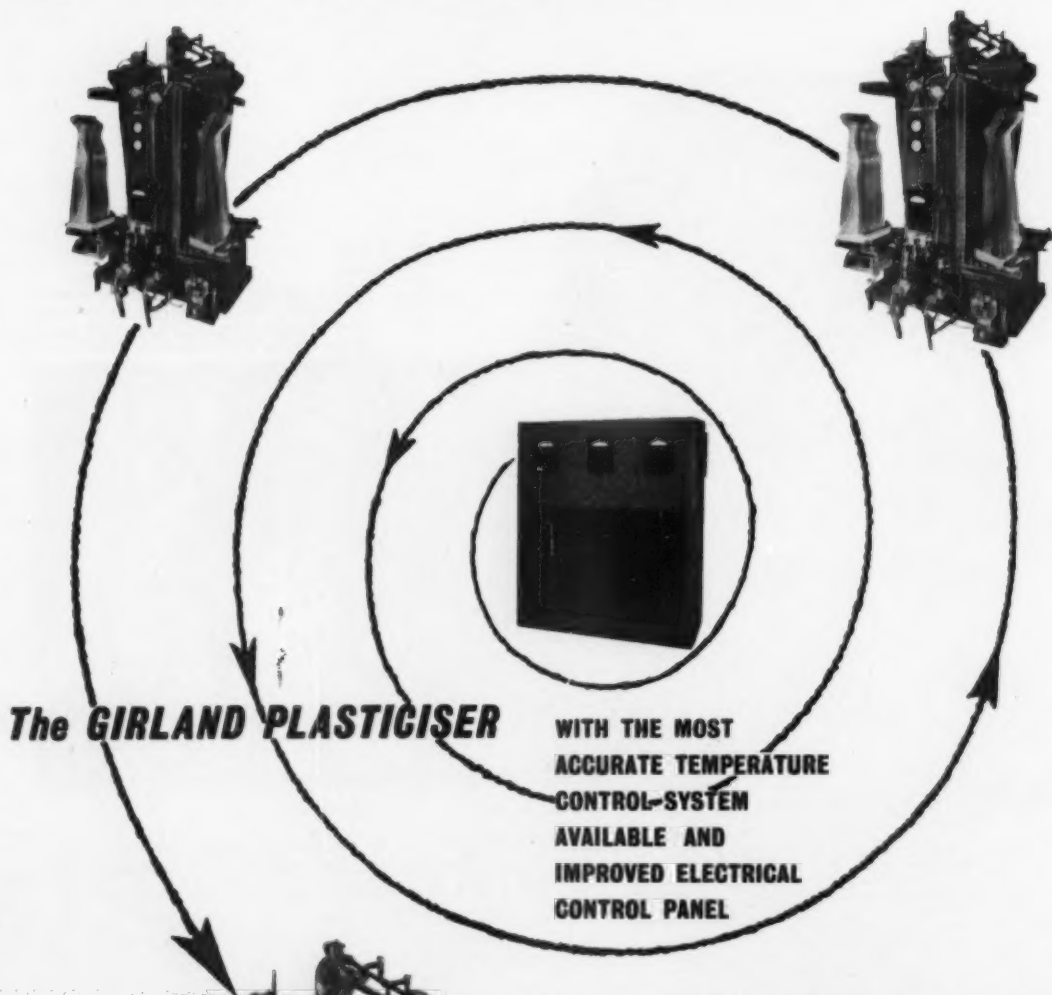
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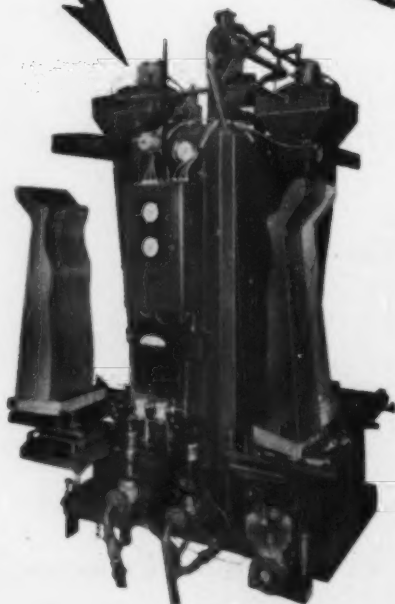
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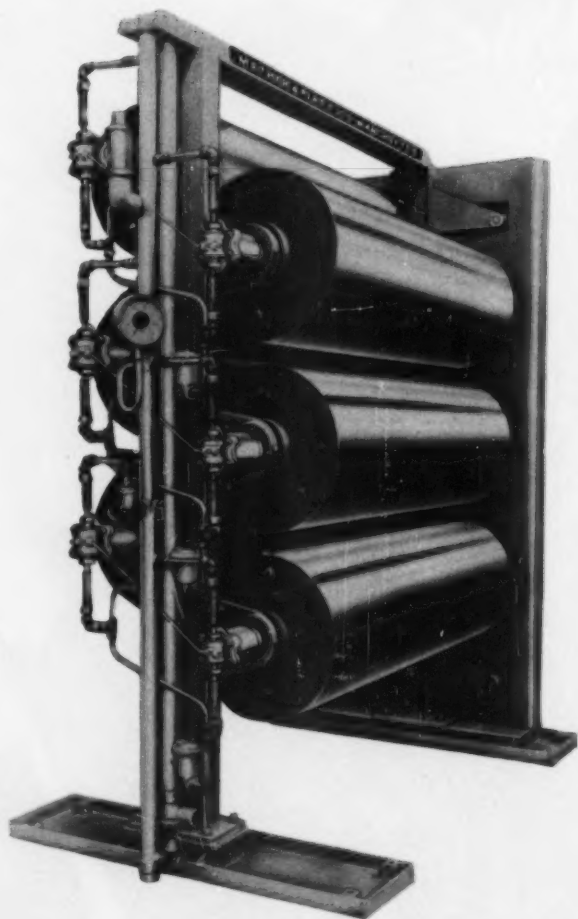
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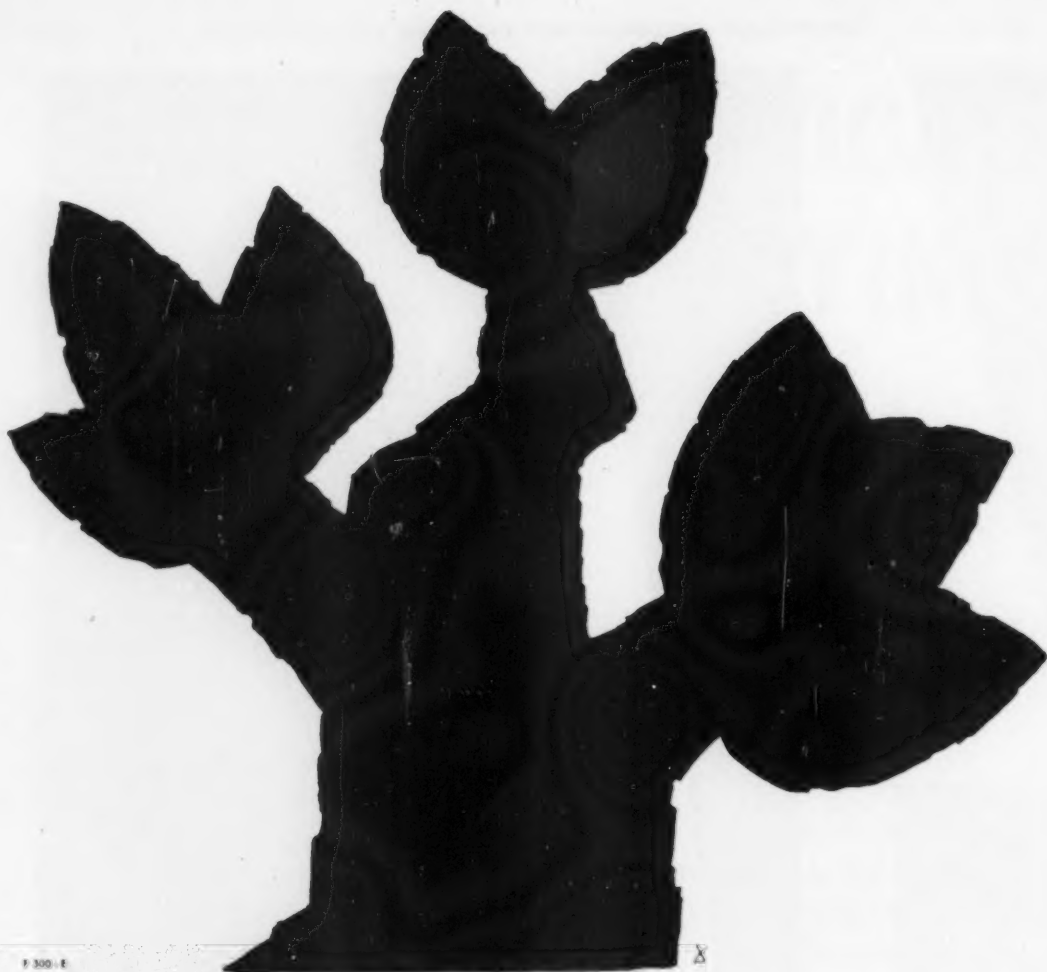
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of Trade, being later awarded the M.B.E. for his services. During the early years of this period he served on the Revision Committee of the first edition of the *Colour Index*.

In 1930 he joined Imperial Chemical Industries (Dyestuffs Division) Ltd, and was soon responsible for preparing agreements with Continental firms. Ten years later he became Commercial Manager

and Group liaison officer in London, playing an important part in the formation of Imperial Chemicals (Pharmaceuticals) Ltd.

In August 1945 Bearder was seconded to the Allied Control Commission in Germany and Austria, and served as a Brigadier until the dissolution of the I.G. in 1947, when he retired.

A. THOMSON

New Books and Publications

Chemical Analysis

Volume XI

X-Ray Spectrochemical Analysis

By L. S. Birks. Pp. xii + 137. New York and London: Interscience Publishers. 1959. Price, 44s. 0d.

This monograph is the second volume on applied X-rays in chemistry.

The information in it appears to be up to date, although of necessity it has to be fairly general. Probably its greatest value is to show the reader other uses of the X-ray method than those of formal chemical crystallography which are dealt with in other publications. Dr. Birks gives a good general description of the methods of producing monochromatic radiation, as well as a survey of the fundamental physics of this process. In particular, he deals very well with the focusing of X-ray beams.

The description of the applications of X-rays covers many topics, and the paragraphs on the dynamics of solids and liquids with particular reference to diffusion and corrosion are most interesting; the references appear to cover the ground of this type of X-ray analysis extremely well. Provided that one considers the work as an introduction and guide in X-ray spectrochemical analysis, one can recommend the use of this monograph by both students and research workers.

F. HAILEY

Symposium on Light Microscopy

A.S.T.M. Special Publication No. 143. Philadelphia: American Society for Testing Materials. 1953. Pp. vi + 126. Price, \$2.50.

This publication records the papers and discussions presented at the above symposium held in New York. Two papers are of a general nature; six others describe the applications of microscopy in various specialised fields of work.

The general introductory paper by Professor Mason of Cornell University is an excellent description of the benefits to be obtained from the microscopical examination of materials. For the textile technician his dictum, "Microscopy before measurement, the direct view before data taking, close-up before calculation . . ." has much to commend it.

The paper by V. W. Tripp, which deals with some applications of light microscopy to textiles, regrettably falls short of the purpose of the symposium as indicated in the introduction, that is, to " . . . present the results of more recent achievements . . .". The bulk of the work described

could equally well have been written at any time during the past twenty years and there is nothing mentioned that is not more adequately described in published work.

Of the other five specialist papers, that by McCrone on "Polarised Light Microscopy and Supplementary Techniques" is noteworthy for the analyst and crystallographer, in that X-ray data, crystal morphology, optical properties, and thermal data are integrated into a comprehensive scheme for the complete description of crystalline material.

The paper by T. G. Rochow on resins and plastics and associated material, is informative and contains much useful information for the textile technician or microscopist who may be called upon to examine bonded-fibre fabrics or similar materials.

It is indeed fortunate for the person whose main concern is with textile material, that the real value of such a collective work as this lies in the information that is provided on a wide variety of subjects. Knowledge of the use of the microscope in other fields enables the specialist worker to question whether his own problems may not benefit from a mode of approach used by others.

S. C. SIMMENS

Symposium on Microscopy

A.S.T.M. Special Technical Publication No. 257. Philadelphia: American Society for Testing Materials. 1959. Pp. vi + 165 + 1 colour plate. Price, \$4.75.

This is a collective work containing the recorded papers, nine in number, delivered during 1959 in Atlantic City, N.J., U.S.A. Unlike the previous symposium held in 1952, which covered only light microscopy, the present one has embraced the results of electron microscopy; indeed, an excellent paper by Newman on "Microscopical Studies of Failure in Polymers" embodies the results obtained from phase-contrast, interference, and bright-field microscopy, as well as the electron microscopy of surface replicas.

Two papers describe work on textile material. The first, "The Structure of Synthetic Fibres", is by R. G. Scott of the E.I. du Pont laboratories, who reviews the techniques used in fibre microscopy. Some techniques used in light microscopy are mentioned, but the treatment of these is brief and superficial. The real value of this most interesting paper lies in the description of the techniques used to prepare the inner structure of fibres for examination in the electron microscope, techniques referred to as orientation splitting and cleavage-plane splitting. Some of the results

obtained are illustrated photographically. For anyone interested in the fine structure of fibres this is a most informative and stimulating paper.

The second paper concerned with textile material is by Mary L. Rollins and co-workers of the Southern Regional Research Laboratory of the U.S. Department of Agriculture and is entitled "Microscopical Evaluation of Cotton Finishing Treatments". This is a good review of the extensive work done in this laboratory, using light and electron microscopy, on the modifications produced in the fine structure of cotton hairs as a result of the application of various finishing treatments. Many of the modifications discussed are illustrated photographically. For those not acquainted with the published work of these laboratories or with the contemporary view of the relation between fine structure and finishing treatment in cotton hairs, this paper provides an excellent survey.

A paper by O. W. Richards, "Measurement with Phase and Interference Microscopes", deals largely with the errors, instrumental and observer, involved in the determination of the refractive index of microscopical specimens. Though fulfilling a useful function, the treatment of the subject is by no means complete. For example, the real possibility of error involved in interference microscopy when using the achromatic fringe to determine the number of whole wavelengths of retardation (see Faust, R. C., and Marrinan, H. J., *Brit. J. Appl. Phys.*, 6, 351 (1955)), is not mentioned. The two references chosen to indicate the fact that the textile industry is using interference microscopy appear an odd choice to say the least, one being a book "The Interference Microscope in Biological Research", the other an interference microscope reference manual. There is a helpful appendix to this paper which contains numerous references and describes methods of obtaining specimen depth or thickness with a microscope.

The remaining papers cover the performance of optical equipment for microscopy, chemical microscopy in the optical industry, the study of opaque minerals in reflected light, electron microscopy in the petroleum industry and the paper briefly referred to earlier concerning a microscopical study of failure in polymers.

This book is a valuable description of current techniques of microscopy in a variety of fields. It is recommended to those whose interests lie in the specialist fields covered, and particularly to those generally concerned with the fine structure of materials and the techniques employed to observe it.

S. C. SIMMENS

Guide to the Identification of Animal Fibres

By H. M. Appleyard. Pp. viii + 118. Leeds: Wool Industries Research Association. 1960. Price, 42s. 0d. (21s. 0d. to members of W.I.R.A.).

This book has been compiled because the use of an ever-widening range of fibres in textiles and other products, in particular furs and brushes, has increased the need for a wide knowledge of the

morphology of animal fibres. Fibres from 44 different species of mammals are described; most are used in the textile industry, some for novelty effects.

The nomenclature used is that of *The Microscopy of Animal Textile Fibres* by A. B. Wildman, published by the Association in 1954. The preparative techniques described in detail in Wildman's book are briefly outlined. They consist in the preparation of whole mounts, cross-sections and scale casts. Descriptions of fibre features are tabulated in alphabetical order of animals producing the fibres; each description is illustrated by one or more photomicrographs. Altogether there are 86 figures, most of which are of three or more parts.

As is pointed out in the Foreword, the book should be of great assistance in the investigation of problems arising in the textile industry; it should also be of value to the forensic scientist and the archaeologist.

M. T.

British Instruments—Directory and Buyers' Guide

Pp. 635 (incl. 305 pp. manufacturers' announcements). London: Scientific Instrument Manufacturers' Association and United Science Press Ltd. 2nd edition. 1960. Price, 45s. 0d.

This is a guide to sources of supply of all British scientific and industrial instruments and their component parts. A classified index of products occupies 128 pp. and the alphabetical list of instrument and component manufacturers 67 pp. This list also gives the addresses of the overseas agents of each firm. A very useful feature is the glossary of headings used in the index of products; it appears in French, German, and Spanish. Other sections of the guide describe the aims and organisation of the Scientific Instrument Manufacturers' Association and other associations allied to the instrument industry, and list relevant British Standard specifications; consultants, engineers and installers of instrumentation schemes; firms able to carry out development work and manufacture prototypes or small batches of instruments to order; and trade names used by firms listed in the guide.

The 305 pages of "manufacturers' announcements" consist of descriptions and photographs of a wide range of instruments and components.

M. T.

Polyester Resins

By John R. Lawrence. Pp. ix + 251. New York and London: Reinhold Publishing Corp. and Chapman and Hall Ltd. 1960. Price, 46s. 0d.

"Polyester Resins" is the fifteenth in the *Plastics Applications Series* of semi-technical books dealing with single, or single families of, plastics and aimed to attract a wide range of readers having a common interest in polymers. The author, who is Product Manager—Plastics for a U.S.A. firm, concerns himself mainly with unsaturated polyesters and their chemistry, curing and application, to the exclusion of fibres, films and foams, and with

little reference to alkyds or polyesters used as plasticisers.

The book consists of eleven chapters and four appendices, the latter running to 54 pages. The first chapter provides an introduction and historical background, and production figures are presented to show the phenomenal growth in the output of polyester resins since 1945. This is followed by a chapter on their chemistry which, whilst it may not satisfy the research chemist, will be readily comprehensible to anyone with a smattering of chemistry; it provides an adequate picture of the rôles of the numerous saturated and unsaturated polyacids, polyalcohols and cross-linking monomers in the polymerisation reactions. A chapter on general properties is followed by one on formulating for special properties; both are liberally accompanied by tables of susceptibility to external influences such as solvents, alkalis, weather, flames, etc., and with references to, and details of performance under, various standard tests. The next chapter deals with manufacturing methods, and, although the author tends to repeat himself, a clear account is given. Chapter 6 describes catalysts and curing, full reference being made to the catalysts and accelerators used. It is

surprising, however, that in spite of going to some length to discourage the use of the word "catalyst" in the sense of an initiator of polymerisation, the author persists in using it.

The remaining chapters describe compounding and the use of fillers, and their influence upon properties, moulding, laminating, miscellaneous applications, and coating. These chapters include clear and informative illustrations, which are an outstanding feature of the book, and descriptions of modern methods where relevant. The appendices enumerate the resins that are on the market in the U.S.A., and describe their properties, advise on "trouble-shooting", provide a glossary on reinforced plastics, and give trade designations for materials and processes.

Only a few obvious errors appear, e.g. the reader is referred to the wrong figures for descriptions of vacuum and pressure moulding. This is probably one of the best books in the series, not only being interesting and informative but having (apart from the appendices) little "commercial" flavour. The book is well bound. It should prove of wide interest, particularly to the technological student and the practising technologist.

R. P. SHELDON

New Books Received

- 1959 Supplements to Book of ASTM Standards. Including Tentatives. Part 6—Wood, Paper, Shipping Containers, Adhesives, Cellulose, Leather, Casein.* Pp. xi + 124. 1959. Part 8—Paint, Naval Stores, Aromatic Hydrocarbons, Gaseous Fuels, Engine Antifreezes. Pp. xi + 237. 1959. Part 9—Plastics, Electrical Insulation, Rubber, Carbon Black. Pp. xvii + 527. 1960. Part 10—Textiles, Soap, Water, Atmospheric Analysis, Wax Polishers. Pp. xiii + 377. 1959. Philadelphia: American Society for Testing Materials.
- Guide to the Identification of Animal Fibres.* H. M. APFLEYARD. Pp. viii + 118. Leeds: Wool Industries Research Assn. 1960. 42s. 0d. (W.I.R.A. members 21s. 0d.).
- Stabilization of Free Radicals at Low Temperatures.* N.B.S. Monograph 12. ARNOLD M. BASS and H. P. BROIDA (editors). Pp. iv + 110. Washington: United States Dept. of Commerce. National Bureau of Standards. 1960. \$1.50.
- Appretur der Textilien. Mechanische und Chemische Technologie der Ausrüstung.* WALTER BERNARD. Pp. viii + 440. Berlin-Wilmersdorf: Springer-Verlag. 1960. DM 58.50.
- Standardization Activities in the United States. A Descriptive Directory.* N.B.S. Miscellaneous Publication 230. SHERMAN F. BOOTH. Pp. iv + 210. Washington: United States Dept. of Commerce. National Bureau of Standards. 1960. \$1.75.
- Annual Reports on the Progress of Chemistry for 1959.* Vol. 56. Pp. 476. London: The Chemical Society. 1960. 40s. 0d.
- Periodicals in the Chemical Society Library.* Pp. 48. London: The Chemical Society. June 1960. 5s. 0d.
- An Introduction to Practical Infra-red Spectroscopy.* A. D. CROSS. Pp. vii + 80 + 1 Table. London: Butterworths Scientific Publications. 1960. 17s. 6d.
- The Chemistry of Natural Products. Vol. V—The Carbohydrates.* S. F. DYKE. Pp. ix + 232. New York and London: Interscience Publishers. 1960. 36s. 0d.
- Style Guide for Chemists.* LOUIS F. FIESER and MARY FIESER. Pp. vi + 116. New York and London: Reinhold Publishing Corp. and Chapman & Hall Ltd. 1960. 24s. 0d.
- Lexikon. Textilveredlung und Grenzgebiete.* Second edition. CARL-HEINZ FISCHER-BOBSIEN. Pp. viii + 1193. Dülmen-Daldrup, Germany: C. H. Fischer-Bobsien. 1960. DM 118.50.
- Mechanics for Textile Students. An Introduction to the Study.* W. A. HANTON. Pp. xi + 336. Manchester and London: Textile Institute and Butterworths Publications Ltd. 1954 (Reprinted 1960). 30s. 0d.
- New Developments in Training. Five Studies in the Efficient Communication of Skills.* New Development Series No. 3. FRANK A. HELLER (editor). Pp. 80. London: Polytechnic Management Assn. Jan. 1959. 5s. 0d.
- Polyester Resins.* JOHN R. LAWRENCE. Pp. ix + 251. New York and London: Reinhold Publishing Corp. and Chapman & Hall Ltd. 1960. 46s. 0d.
- The Technique of Photomicrography.* DOUGLAS F. LAWSON. Pp. xvi + 256 + 82 half-tone pp. + 4 pp. colour plates. London: George Newnes Ltd. 1960. 55s. 0d.
- Chromatographic Reviews. Progress in Chromatography, Electrophoresis and Related Methods. Vol. 2. Covering the Year 1959.* MICHAEL LEDERER (editor). Pp. viii + 195. Amsterdam: Elsevier Publishing Co. 1960. 46s. 0d.
- A Practical Manual of Industrial Finishes on Wood, Metal, and other Surfaces.* B. M. LETSKY. Pp. xii + 251 + 17 half-tone pp. London: Chapman & Hall Ltd. 1960. 35s. 0d.
- An Introduction to the Organic Chemistry of High Polymers.* CARL S. MARVEL. Pp. viii + 82. London: John Wiley & Sons Ltd. 1959. 36s. 0d. (\$4.50).
- Veredler-Jahrbuch. Deutscher Färbekalender für das Jahr 1960.* 64 Jahrgang. O. MECHEELS (editor). Pp. iv + calendar + 384 + iv half-tones + 60. München: Franz Eder Verlag. 1959. DM 15.50.
- Rapid Statistical Calculations. A Collection of distribution-free and easy methods of estimation and testing.* M. H. QUENOUILLE. Pp. xv + 72 + ix. London: Charles Griffin & Co. Ltd. Dec. 1959. 10s. 0d.
- British Instruments. Directory and Buyers' Guide 1960.* Second edition. SCIENTIFIC INSTRUMENT MFRS' ASSOC. Pp. 292 + RI-R305 + 294-330. London: United Science Press Ltd. 1960. 45s. 0d.

Oberflächenaktive Anlagerungsprodukte des Äthylenoxyds, ihre Herstellung, Eigenschaften und Anwendung.
NIKOLAUS SCHÖNYELD. Pp. xvi + 452. Stuttgart: Wissenschaftliche Verlagsgesellschaft m.b.H. 1959. DM 68.00.

Textile Terms and Definitions. Fourth edition. Pp. 167. Manchester: Textile Institute. Jan. 1960. 17s. 6d.

Year Book of the Textile Institute. No. 12, 1960-1961. Including List of Members. Pp. 74 + m1-m218. Manchester: Textile Institute. May 1960. 21s. 0d. (Free to members of the T.I.)

Analytical Applications of Diamino-Ethane-Tetra-Acetic Acid. Second edition. T. S. WEST and A. S. SYKES. Pp. 127. Poole, Dorset: British Drug Houses Ltd. 1960. 4s. 6d.

Manufacturers' Publications and Pattern Cards

The Society does not accept any responsibility for the statements in the following notes. Any publication abstracted may be referred to by members of the Society on application to Dr. C. B. Stevens, Dyeing Department, Leeds University.

Badische Anilin- und Soda-Fabrik A.G.

ORTOLAN and ORTOL DYE STUFFS ON WOOL AND POLYAMIDE FIBRES.—This card describes a range of fifteen Ortolan dyes and four Ortol dyes, the former being 2:1 dye-metal complexes and the latter neutral-dyeing acid dyes having similar dyeing properties and fastness characteristics and intended to supplement the metal-complex types when these cannot give dyeings of sufficient brightness. Both ranges are particularly suitable for wool and silk, polyamide fibres, bast fibres, and the wool component of wool mixtures. They are also of interest for direct printing on protein and polyamide fibres and for mélange-printing. The card contains a very comprehensive range of dyeings of each dye, including dyeings in seven depths on wool cloth and in a single depth on wool slubbing and on Perlon slubbing. A separate section contains dyeings on wool cloth of ten mixtures, each in five depths, and a further 110 mixture dyeings on yarn.

British Titan Products Co. Ltd.

PERFORMANCE DURING NATURAL WEATHERING OF SOME WHITE AND COLOURED EMULSION PAINT SYSTEMS.—A reprint of a paper by A. D. Hibberd originally published in *Verfkronek* (June 1957) and in *Paint Technology* (Jan. and Feb. 1959).

Ciba Ltd.

SPECIALITIES FOR PROCESSING AND FINISHING.—This is a comprehensive catalogue of the various products available for use in the processing of textiles, paper, metals, and leather. They have been classified according to fields of application and to specific textile applications, as well as being listed individually with a short description of their uses, properties and the amount required. In addition, an appendix summarises the marketed quality, ionic properties, and preparation for use of each. A separate table summarises the suitability of the various brands of fluorescent brightening agents for application to particular substrates.

CIBA REVIEW NO. 136.—Technical articles in this issue include the production of pale dyeings using Microfix pigments and the new one-binder Microfix process; one-bath methods for dyeing wool-acrylic fibre mixtures using Univadine W; and anti-soil finishing of tufted carpets with Anti-soiling TC.

CIBA REVIEW NO. 137.—This issue is devoted to discussion of the chemistry, preparation, and properties of addition polymers, including polyvinyl chloride, polyacrylonitrile, polyvinyl alcohol, and polyolefins. Technical articles include the pretreatment and dyeing of PVC fibres and Dynel; the saturation values, *K* factors and rate-of-dyeing curves of Deorlene dyes on Orion 42; and printing of synthetic fibres.

CIBA REVIEW NO. 139.—This issue is primarily concerned with chlorine and, in particular, its production and industrial applications. Articles of special interest include "Chlorine in Dyestuffs Chemistry", "Tests for Chlorine Fastness" and "Cibanone Dyes in Coloured Piece Bleaching".

CIBACRON YELLOW G.—This reactive dye gives bright yellows, intermediate in hue between Cibacron Brilliant Yellow 3G and Yellow R. It is of interest for dyeing cellulosic fibres and wool and also for printing these fibres and silk. Fastness figures on cotton include—light

(Fadeometer) 7, washing (SNV, C) 4, perspiration (SNV) 4 redder.

ALBATEX PO and POM Conc.—This booklet (19 pp.) describes the properties, application and uses of two anionic surface-active agents particularly recommended as levelling agents for use when dyeing cotton, viscose rayon, and secondary cellulose acetate, as levelling and stripping agents for vat dyes, and as softening agents for cellulosic materials and cellulose acetate.

MELAFIX CH and MELAFIX II IN THE CHLORINATION OF WOOL.—This booklet (32 pp.) describes, with full working details, these two processes for shrink-resist treatment of wool goods, uniformity of treatment being achieved by the formation of chloramines by reaction of the chlorine with the Melafix CH or II, followed by its subsequent slow release and absorption by the wool. Illustrations include photomicrographs, photographs (some in colour) of various types of goods before and after treatment, and graphs illustrating the essential stages in the process.

Farbenfabriken Bayer A.G.

LEVAFIX DYE STUFFS.—This card describes seven reactive dyes suitable for padding or printing on cellulosic fibres, followed by fixation by neutral steaming for 7-8 min. or by dry-heating at 140-150°C. for 4-5 min. Two members of the range, Levafix Yellow 4G and Brilliant Blue 13G, are identical with the Permafix Yellow 4G and Brilliant Blue 3GL previously issued (see J.S.D.C., 76 (July 1960) 447). A feature of these dyes is that caustic soda must be added to print pastes and padding liquors to dissolve them. Print pastes and padding liquors are stable for days, or even weeks, at 20°C., and dried printed materials may be stored for several days before being fixed.

Farbwerke Hoechst A.G.

REMAZOL BRILLIANT RED BB.—This reactive dye gives bright bluish reds on cellulosic materials. It is suitable for pad-dyeing and printing, both direct and for white and coloured discharges. Fastness figures on viscose rayon crêpe include—light 5-6, washing (95°C.) 3, perspiration 5.

REMAZOL YELLOW GR.—This reactive dye gives bright reddish yellows when dyed and printed on cellulosic fibres, and is of interest alone and in mixtures, particularly for browns and olives. Fastness figures on cotton include—light 6, washing (75°C.) 5, perspiration 5.

J. R. Geigy A.G.

VAT DYES ON COTTON: TINON AND TINA COLOURS.—This card contains dyeings in two depths on bleached cotton yarns of 37 Tinon (anthraquinonoid type) and three Tina (indigoid type) vat dyes. The Tinon dyes are available in several physical forms, including Paste and Fine Powder, Paste Extra Rapid (particularly for printing), and Paste M Disperse and Powder M Disperse, these latter having the smallest and most uniform particle size (0.2-1 μ) and being especially suitable for application by prepigmentation.

REACTONE DYES IN PADDING.—This card describes the pad-application of 12 reactive dyes from the Reactone range. It contains dyeings of each member in three depths on cotton cloth, and also 16 mixture dyeings from bulk production. These dyes are marketed in highly concentrated form, low in salt content. They are very

soluble, and give solutions which remain stable for several weeks at 20-25°C., even in presence of up to 20 g./l. of soda ash. As they have virtually no substantivity for cellulose, the removal of dye not chemically bound to the fibre presents no difficulty. Fixation by dry-heat or steam is complete in a short time, and very good reproducibility is possible when continuous methods are used.

Industrial Dyestuffs Ltd.

ASTRAZONE DYESTUFFS ON COURTELLE FIBRE—This card contains dyeings in two depths on Courtele acrylic-fibre yarn of 28 Astrazone dyes. Seventeen of these belong to the Astrazone L range characterised by giving dyeings of high fastness to light and wet treatments. The remainder are included as they find some limited use by virtue of their brilliant colour. Ten mixture dyeings are also included.

Imperial Chemical Industries Ltd.

TECHNICAL INFORMATION LEAFLETS—*Dyehouse No. 559. Procion Dyes on Spun Viscose Rayon: Winch Dyeing*—The range of "cold-dyeing" Procion dyes may be applied to viscose rayon cloth at 50-70°C. at pH 7-5. More uniform dyeings are obtained with marked improvement in colour yield in certain cases. The increase in colour yield results from improved dye penetration; the higher the filament denier or the denser the material, the more marked the result. The process is of little interest on cotton, except perhaps when using Procion Brilliant Blue R.

Dyehouse No. 560. Dyeing of Black Shades on Synthetic Fibres and their Unions—This note summarises the recommendations already issued for producing blacks on secondary cellulose acetate, cellulose triacetate, Acrilan, Courtele, nylon, Orlon, Terylene and the more important mixtures containing these. Where working details are already available, reference is made to the relevant publication. Where these have not been published, or where further experience has warranted alterations, full details are given in the text, the eighteen pages of which indicate the ever-increasing complexity of the dyer's task.

Dyehouse No. 564 (Replaces No. 241). Dyeing of Buttons—Additional information is given supplementing that provided in the Technical Circular, *The Dyeing of Buttons*, issued in 1951.

Dyehouse No. 566 (Replaces No. 223). Coloured Laundry and Textile Marking Inks—A range of coloured inks is offered as an alternative to the hitherto almost exclusively used black inks. The inks are based on mixtures of finely divided pigments, water, and Bedacryl L, thickened if required with Calasec MAH or Cellofas B. They may be applied either by pen or by stamp and no aftertreatment is required to develop them. They have not the same absolute permanence as the silver-based inks, but their resistance on cellulosic fibres is adequate for most purposes. Markings on wool, silk, nylon, and Terylene are less fast, but still reasonably so.

Dyehouse No. 567. Use of Organic Pigments in Formulating Lead-free Green Paints of Improved Durability—Recipes are given for producing a range of full-depth greens based on blue and yellow organic pigments and iron oxide or Turkey Red oxide. These are superior in fastness to those based on Brunswick Greens and in general cost only 5-10% more to produce.

Dyehouse No. 568. Printing of Terylene-Wool Fibre Unions—Prints of good all-round fastness and solidity of colour may be obtained on 55/45 Terylene-wool blended cloth using vat dyes applied by the acid-leuco process, with Manofast as the reducing agent, and Glydote B and Tumescal PH as swelling agents.

Dyehouse No. 569. Detection of Surface-active Agents in Textile Fabrics—Tests are described for the qualitative determination of anionic, cationic and non-ionic surface-active agents, using Methylene Blue ZF, Bromophenol Blue and phosphomolybdic acid, respectively, to produce the coloured complexes on which identification is based.

Dyehouse No. 570. The Determination of Colour Fastness—Many of the test methods given in "The Fastness Assessment of Textile Dyestuffs", 2nd Edition, 1954, are now obsolete and the manual is therefore being withdrawn. With few exceptions, the tests used by the Dyehouse Department are those given in "Standard

Methods for the Determination of the Colour Fastness of Textiles", 2nd Edition, 1960. Appendix 1 of this note tabulates the national equivalents of these tests. Appendix 2 gives details of the tests devised by the Dyestuffs Division which are still in use. These include assessment of fastness to anti-crease processing, cellulose ester bonding, crabbing, dry-chemicking, PVC-coating, scrooping, scrooping with Cirrasol SF, silicone treatment, soda-boiling hypochlorite bleaching, aftertreatment with Velan PF and NW, washing (I.C.I. Tests Nos. 3 and 5), chemical washing, weathering, and change in hue under tungsten light. Appendix 3 gives a complete list of all Dyestuffs Division publications concerned with colour fastness.

Dyehouse No. 571. The Use of Velan PF and Velan NW in the Production of Durable Oil- and Water-repellent Finishes on Textiles.

Dyehouse No. 572. Illumination for Colour Matching—The chief characteristics of six currently available daylight-matching lamps are given and the significance of colour temperature, intensity and ultraviolet content is discussed with reference to daylight and daylight-matching lamps.

Dyehouse No. 573. Wool Dyestuffs: Effect, on Shade and Wash Fastness, of the Stevenson "X" Process for Dylan Shrink-resistant Wool—This process is based on treatment of wool with permonosulphuric acid followed by sodium sulphite, either before or after dyeing. Its effect on the hue of dyed wool, and particularly on the hue of accompanying dyed cellulose, acrylics, nylon and Terylene, is much less than other processes. Data are given for the effect of the process on the hue of dyeings, their fastness to washing, and the fastness to washing of dyeings on shrink-resist-treated wool. Dyes used include fast-to-milling acid dyes, chrome dyes applied by after-chrome and single-bath, and 1:1 metal-complex dyes.

Dyehouse No. 575. Wool Dyestuffs: Fastness to the Sironized "Easy-care" Finish for Wool Fabrics—Fastness data for ranges of level-dyeing acid, fast-to-milling acid, 1:1 metal-complex, reactive and chrome dyes are given, together with the method of test and some general observations.

Dyehouse No. 576. Dyeing of Polyester-Cellulosic Unions: Continuous Methods—This leaflet contains the information on the method of using Solcedon dyes given in T.I. 392 and also replaces T.I. 472. Methods described include—(1) Pad-pad-develop using solubilised vat dyes; (2) Pad-dry-heat using reactive and disperse dyes; and (3) Pad-dry-heat-vat develop using either vat dyes alone or vat dyes and disperse dyes. Working details are given together with tables of suitable dyes.

Dyehouse No. 577. Anti-soil Finishing of Suede Leather—Treatment of suede leather with Cirrasol AR, an anionic surface-active agent, has been found to reduce the tendency to finger marking by preventing wicking of the natural oils from the fingers into the suede.

Dyehouse No. 578. Disperse Dyestuffs on Nylon: Fastness to Mechanical Washing A.

Dyehouse No. 579. Stripping of Procynyl Dyestuffs from Nylon—Dyeings of Procynyl Yellow G, Orange G, Scarlet G and Rubine B can be stripped to a faint tint of the original colour using boiling acid sodium sulphonylate formaldehyde. Blue R is converted to an olive green under these conditions and then to a light reddish blue using acid sodium chlorite at 60°C.

Dyehouse No. 580. The Procion-Resin Process—Since, although basically simple, the Procion-Resin process introduces a new approach to dyeing, and since many of its features are in apparent contradiction to the principles underlying the application of these dyes by normal methods, this pamphlet has been prepared. Twenty-nine questions of detail, both practical and theoretical, are asked and answered.

CHLORAZOL PAPER YELLOW FG—This direct dye gives reddish yellows brighter in hue than those obtained with Chlorazol Paper Yellow G. Colourings have outstanding fastness to alkali and are recommended for all papers likely to come into contact with alkaline adhesives. Fastness figures include—light 3, alkali (1% caustic soda) 5, bleaching 5.

DURAZOL TURQUOISE BLUE FB—This homogeneous direct dye, S.D.C. classification B, gives bright blues of high light fastness on cellulosic fibres. Dyeings are slightly redder than those obtained using Durazol

Turquoise Blue GR and redder still than those from the Blue 8G brand. Fastness to water and washing is somewhat better than that of Blue 8G dyeings and is improved considerably by aftertreatment with Fixanol PN. Resin-finishing causes some reduction in light fastness, but this dye is still recommended for use on dress materials on account of brilliance of hue. Both aftertreatment with Fixanol PN and resin-finishing increase the tendency to phototropic fading. Fastness figures on cotton include—light (Wilmslow) 6, washing (S.D.C. Wash Test No. 2) 2, perspiration ("natural") 2.

PROCION "H" DYE STUFFS IN TEXTILE DYEING—A revised introductory text (27 pp.) has now been introduced (Ref. 8085) for this card. This also supersedes T.I. Leaflets No. 375, 441, 442, 498, 527 and 540.

PROCION YELLOW GR—When dyed on cellulosic fibres this homogeneous reactive dye gives reddish yellows of good fastness to light, washing, and hypochlorite. It is tinctorially stronger, more stable to heat and less substantive than Procion Yellow R, being, in consequence, less prone to staining in washing and tailing in padding; dye not chemically bound is more easily removed during soaping. It is much more salt-sensitive and the recommended electrolyte is Glauber's salt and not common salt in batchwise dyeing. Fastness figures on cotton include—light (Bombay) 6, hypochlorite 4-5, soda-boiling 4-5.

PROCION BRILLIANT YELLOW H3G—This homogeneous reactive dye gives bright greenish yellows, redder and duller than those obtained with Brilliant Yellow H5G, and greener and a little brighter than those given by Yellow HA. It may be applied to cellulosic fibres by any of the methods recommended for the "H"-brand dyes and also gives moderate to good colour yield when applied by hot batchwise methods. Fastness figures on viscose rayon include—light (Wilmslow) 6, washing (Test No. 5, 5 times at 100°C.) 4.

PROCION BLUE 3R—This homogeneous reactive dye is the first of the range to give navy blues on cellulosic fibres. It has comparatively high substantivity and builds up well on cotton, particularly on mercerised cotton, but less well on viscose rayon. It is of interest alone and in mixtures where a blue of better resistance to chlorine liquors and gas fumes is required. For dyeings of maximum fastness to wet treatments, particular attention must be paid to washing-off. Some reduction in light fastness occurs with some types of resin-finishing. It is not recommended for use on materials subsequently to be vulcanised, nor should it come in contact with sequestering agents. Fastness figures on cotton include—light (xenon arc) 6-7, hypochlorite (1/1 standard depth for navy on mercerised cotton) 4 redder, washing (as navy blue on mercerised cotton; Test No. 5, 5 times at 100°C.) 4.

PIGMENTS AND DYES FOR FLAMBOYANT LACQUERS—This card describes a range of pigments and soluble dyes suitable for use in transparent lacquers and metallic finishes of all types. The illustrations represent the colours obtained in a urea-formaldehyde stoving finish, the resin used being Paralac 2001. The products described are divided into two groups. The first contains 18 dyes of high light fastness and durability, suitable for exterior use. The second contains 22 dyes which give colourings of only moderate to good light fastness.

CALEDON AND DURINDONE DYES ON COTTON—This card contains dyeings in three depths of 81 Caledon (anthraquinonoid) and 10 Durindone (indigoid) vat dyes, the former being dyed on yarn and the latter on cloth. The card is of the now widely adopted loose-leaf type and contains an outline of the main features of application procedures and full details of fastness properties. The symbol [F] following the dye name denotes suitability for use for Felsol-labelled goods; 77 dyes have been so designated.

FDN CALEDON GRAINS—A new range of six redispersible vat dyes has been marketed to supplement the

existing SQ Caledon Grains. The dyes have all the desirable qualities of the original FD Powder Fine brands and, in addition, are granular and give dispersions of considerably improved stability. The superior stability of the dispersions obtainable has led to the introduction of a new method for dyeing packages, using a prepigmentation method in which the pigment dispersion is circulated through the package for 10-15 min., after which the caustic soda and hydros are added together and dyeing is continued in the normal way. The FDN Grains show little tendency to exhaust on to the material, and when such exhaustion is desired the SQ Grains or FD Powder which follow the general laws of pigment aggregation must be used. The FDN Grains can also be used in any printing applications for which the FD Powders are at present used.

Sandoz A.G.

THE DYEING PROPERTIES OF ACID AND ACID ALIZARINE DYE STUFFS—This is a volume of graphs illustrating the dyeing behaviour of each of 163 dyes, divided into four groups according to dyeing behaviour and fastness characteristics. Each dye is characterised by two graphs. In the first, the rate of uptake of dye is plotted against time/temperature for two and, in some cases, three different sets of dyebath conditions representing those commonly used in practice. The second graph is intended to characterise the strike/migration properties of the dye and is based on the chromatographic technique, using wool felt discs, developed by Egli and Perrig (*Textil-Rund.*, 9 (1954) 61). A column 7 cm. long by 1.5 cm. in diameter and made up of 42 discs, each weighing 3 g., is prepared. The dyebath, volume 135 ml., is passed down the column at 98°C. and then recirculated at a constant rate (360 ml./min.) for 2 hr. at this temperature. The position in the sequence from top to bottom of the column of the disc showing maximum depth of colour is noted. The procedure is repeated using three sets of pH conditions and the numbers of the maximum-depth discs are plotted against pH. The shape and disposition of the curve obtained provides, it is claimed, a much more exact estimate of the levelling power of the dye than do the more conventional tests. For purposes of comparison, two sets of typical curves based on the behaviour of each of two groups of four dyes exhibiting very good to moderate levelling when applied over the pH range 2-4 and 4-6, respectively, are supplied printed in red on transparent material to facilitate superimposition on any of the other curves. This publication forms the second volume of the new pattern card describing the acid and Acid Alizarin dyes, the first volume of which is still being prepared.

PALETTE No. 5—Articles of particular technical interest include "Colour and Lighting" by M. Dérivé, "The Carbazole Dyes" by W. Bradley, and "The Contribution of Plastics Research to the Development of the Chemistry of Synthetic Fibres" by H. Hopff. A more general article, "Package Design and Colour Psychology", by M. Lüscher, is equally interesting in revealing the part that the colour of the package plays in sales promotion.

DRIMARENE RED Z-RL—This new reactive dye for printing cellulosic fibres gives bright reds of good fastness to light and wet treatments. Fastness figures on cotton include—light (daylight ISO) 6, washing (95°C. ISO) 5, perspiration (ECE) 5.

DRIMARENE SCARLET Z-GL—This reactive dye gives bright orange-reds when printed on cellulosic fibres. Fastness figures on cotton include—light (daylight ISO) 6-7, washing (95°C. ISO) 5, chlorinated water (ECE) 3.

Yorkshire Dyeware & Chemical Co.

SERISELECTOR II—This is the second edition of an instant colour selector of disperse dyes for man-made fibres. The original format is retained, thus allowing very rapid reference to the selections of dyes suitable for particular fibres, together with dyeing and fastness characteristics.

Abstracts from British and Foreign Journals and Patents

The titles of abstracts may be modified. Abbreviations of names of firms are listed in J.S.D.C., 68, 23 (Jan. 1952), and also, together with symbols and the periodicals abstracted, in the annual index

I—PLANT; MACHINERY; BUILDINGS

COPE—A Card-operated Process-timing Equipment Primarily Intended for the Control of Dyebaths
I. R. Reynolds J.S.D.C., 76 (Oct 1960) 584-587

Size Box *Fibres & Plastics*, 21 (July 1960) 213
Yarn is nipped between the feed roll and a rubber-covered roll; this excludes air normally trapped between individual ends. The size level is maintained at the point of release from the above nip so that size is drawn in as the yarn expands on recovery; this gives a high degree of penetration, even with high-density filament warps. Yarn is positively driven at both entry and exit so that virtually no stretching is imposed. There is a photograph of the machine, the Sizemaster. J.W.D.

PATENTS

Carbon Black (C.I. Pigment Black 6 and 7)
Phillips Petroleum Co.

BP 843,786 (U.S.A. 3 Oct 1955)
Improved apparatus using several reactors. The feed injector tubes can be decocked without interfering with either production or the quality of the pigment. C.O.C.

Continuously Heated Carbon Black Furnaces
Commercial Solvents Corp.

BP 844,345 (U.S.A. 5 July 1957)
Method and apparatus for producing Furnace Black (C.I. Pigment Black 7) continuously from a cheap hydrocarbon fuel. C.O.C.

Wet Pelletizing of Carbon Black (C.I. Pigment Black 6 and 7)
Phillips Petroleum Co.

BP 845,041 (U.S.A. 20 Mar 1957)
BP 849,538 (U.S.A. 5 Aug 1957)

Pelletizing of Pigments
Godfrey L. Cabot BP 847,697 (U.S.A. 26 Feb 1957)
A pelletiser of the type described in USP 2,306,698 can be worked continuously for long periods without deterioration of pellet quality if the pigment is not allowed to cake on the agitator pins. This is accomplished by covering each pin with an elastomeric material, e.g. rubber. This covering resists the abrasive action of the turbulent bed of pigment. C.O.C.

Removing Water from Coils of Yarn
Scholl BP 844,554 (Switzerland 2 Sept 1957)
Conveyors take and charge the yarn into cages where it is centrifuged. The conveyors work automatically as soon as the cages are free to take the yarn. Preferably the yarn is also removed automatically from the cages after a set period of centrifuging. C.O.C.

Singeing Synthetic Polymer Yarns
ICI BP 847,845 (19 May 1958)
The yarn is passed rapidly through a device where the protruding fibres strike in succession a number of hot flat surfaces. The surfaces are on both sides of the path of the yarn and transverse thereto so that the fibres are severed by the hot edges of the surfaces. C.O.C.

Fluid Bed Machine for Heating and Drying Textiles
F. Smith & Co. (Whitworth) BP 842,505 (19 Feb 1958)
Tension on the fabric is reduced to a minimum and very effective treatment is obtained if the bed comprises three zones. In the central zone the hot particles move upwards and in the two outer zones they move downwards to be reheated. The fabric passes through the central zone only. C.O.C.

Apparatus for Preshrinking and Steaming Fabrics
Etablissements Maurice Heliot BP 844,320 (France 7 June 1957)
A steaming calender unit has a steam box in which the fabric can be kept under no or any desired tension. It is followed by a drying unit, a second steam box and a final drying unit. The apparatus is especially suitable for treating knitted fabric before it is made up. C.O.C.

Heat-cleansing and Setting of Fibreglass Fabric
Owens-Corning Fibreglass Corp.

BP 845,681 (U.S.A. 8 May 1957)
Describes method and apparatus for preparing the fabric for dyeing or printing. C.O.C.

Sprinkling Powder on Webs or Foils (X p. 709)

II—WATER AND EFFLUENTS

Textile Waste Treatment

J. L. Brown Dyer, 124 (9 Sept 1960) 375-376
The development of a modified sewage plant for the treatment of waste liquors is described. The liquors requiring treatment are from the desizing and alkaline cleaning stages of a continuous peroxide bleaching process, both of which have a very high B.O.D. The former is slightly acid, ferments rapidly and cannot be stored; the latter is highly alkaline and can be stored. The plant has seven stages: (1) caustic storage lagoon, (2) primary clarifiers, (3) trickling filters, (4) secondary filters, (5) chlorine contact tank, (6) sludge digesters, (7) vacuum filters. The wastes are fed in separately, the desizing waste into (2), where coagulation is assisted by lime, and the alkaline waste into (1), from whence it is fed into the plant on a 7-day basis to maintain a sewage pH of 11.5 at the plant entrance (a much higher pH than normal). Fan ventilation was necessary in stages (3) and (4) to prevent odours. As the starch waste sludge decomposes rapidly, only 10 days, instead of the more usual 30 days, at 95-100°F. are required for digestion. W.P.M.

III—CHEMICALS; AUXILIARY PRODUCTS; FINISHING MATERIALS

Absorption of Ethylenediaminetetra-acetic Acid Complexes of Zinc, Cadmium, Zirconium, and Niobium by Anionic Exchangers

M. Wald Mh. Chem., 91 (30 June 1960) 505-518
For this purpose the EDTA complexes of the radioactive indicators ^{65}Zn , ^{109}Cd , ^{90}Zr , and ^{95}Nb are absorbed by columns of the strongly basic resin Dowex IX4. Measurements of the distribution coefficient between nitrate-charged exchanger and EDTA-containing nitrate soln., and between EDTA-charged exchanger and EDTA soln., throw light on the composition of the complexes and the nature of the exchange procedure. Within the pH range 3.0-8.8, Zn forms a negative divalent complex which is more strongly absorbed than the lead complex. At nitrate-charged exchanger columns the elution velocity is very strongly influenced by the EDTA-content of the eluting soln., as soon as the ratio $[\text{NO}_3^-] : [\text{H}_2\text{Y}^{2-}]$ falls below ~ 100 ; at pH 5.0-10.0 the Cd complex behaves similarly but is less strongly adsorbed. At pH 5.0-7.5 Zr is absorbed as a divalent zirconyl complex, but below pH 3.0 as a univalent complex of composition ZrH_2Y^- . Nb is retained by the exchanger column as a radio colloid. Comparison of the absorption of the complexes ZnY^{2-} , PbY^{2-} , and CdY^{2-} indicates that the complex formation const., as also the charge number, is not the decisive factor for the absorption strength. The possibilities of radiochemical separations of Zn, Cd, Pb, and Bi on the one hand and of Zr and Nb on the other are pointed out. H.H.H.

Sodium Dithionite (C.I. Reducing Agent 1) Decomposition in Aqueous Solution and in the Solid State

M. W. Lister and R. G. Garvie
Canadian J. Chem., 37 (1959) 1567-1574
Chem. Abs., 54 (25 July 1960) 13832
When Na dithionite is decomposed in aqueous NaOH, the reaction is bimolecular between $\text{S}_2\text{O}_4^{2-}$ and water with a rate constant of 4.5×10^{-4} per min. at 88.5°C. and an

activation energy of 26.5 kcal./mole. Initially $S_2O_8^{2-} + H_2O \rightarrow HSO_4^- + HSO_4^-$, followed by $HSO_4^- + S_2O_8^{2-} \rightarrow HSO_4 + S_2O_8^{2-}$. Both increase in ionic strength and NaOH concentration increase the rate of reaction moderately. The decomposition of solid dithionite is not so straightforward. The data best fit the theory of random nucleation followed by linear growth of nuclei with possible ingestion and interference of reaction zones. The activation energy for nucleation is 40–45 kcal./mole and for nuclear growth 32–33 kcal./mole. C.O.C.

Structure and Length of Hydrocarbon Chains and the Emulsifying Properties of Detergents

P. A. Demchenko and A. V. Dumanskii

Kolloid. zhur., 22 (May–June 1960) 272–276
Solubilising capacity (with respect to toluene and heptane), heat of wetting, and critical concn. of micelle formation (CCM) of sodium soaps of saturated fatty acids and naphthenic acids, alkyl sulphates, and alkylbenzenesulphonates have been measured and related to structure and length of the hydrocarbon chain. Homologues of these detergents which possess emulsifying power have a CCM of 0.3–7.0 g./l. and solubilise 0.2–0.5 mole of hydrocarbon per mole of detergent in 0.1M. soln., whilst low-mol. homologues having CCM > 7 g./l. possess only weakly solubilising and emulsifying properties. Calc. values of CCM (using a formula proposed by the authors) are in good agreement with experimental results. Surface-active compounds of high detergent power are obtained when chain radicals of optimum length $C_{14}-C_{18}$ are linked to hydrophilic groups through a primary carbon atom. On the other hand, cyclic and mixed hydrocarbon chains must be bonded to functional groups so as to yield molecules of max. length. G.J.K.

Progress in Antistatics for Textiles

Fibres & Plastics, 21 (Aug 1960) 245–246
Many problems arise in the high-speed processing of man-made fibres owing to their tendency to build up high static electrical charges that they cannot dissipate—largely because of their low moisture uptake. No satisfactory solution yet exists but those antistatic agents so far available are reviewed; included are those of a permanent and wash-fast nature and those that can be regarded only as processing aids. J.W.D.

Organic Catalyst for Crease-resist Finishes on Viscose Fabrics

Z. Endrusyak and E. Bzhezinskii

Tekstil. prom., 20, No. 6 (June 1960) 71–72
Complexes of boric acid with the polyhydric compounds mannitol, sorbitol, and glucose, were tried as catalysts in curing urea-formaldehyde resins. The most successful was the complex of boric acid and glucose (from potato syrup) prepared by mixing warm solutions of these compounds in ratio of 1 mol. boric acid to 1 mol. glucose. Optimum catalyst concentration was 20–25 g./l. L.S.L.

PATENTS

Antistatic Lubricant for Polyester Fibres

Vereinigte Glanzstoff-Fabriken

BP 845,688 (Germany 28 June 1957)

Polyethylene terephthalate fibres are treated with a solution of the product obtained by treating polyethylene glycol with a metaphosphoric acid alkyl ester and then with an alkyl or alkylol amine. C.O.C.

Surfactants for use in Milling and Scouring

Nopco Chemical Co. USP 2,918,428 (7 July 1955)

Mixtures of fatty amide condensates with sulphated fatty acids of high SO_3 content are very stable in aqueous solutions containing large amounts of carbonates. They are superior to soap for milling and scouring and enable milling or scouring to be carried out immediately after carbonising without use of a separate treatment to neutralise or remove the acid. The fatty amide condensates used are obtained by reaction of 1.5–3.0 mol. of alkylolamine, e.g. diethanolamine, with 1 mol. of a fatty acylating substance of > 11 C, e.g. a 3:1 mixture of coconut oil and tallow. C.O.C.

Rootproofing Agents

Monsanto Chemicals

BP 844,329 (26 Feb 1958)
2-Allylphenols substituted in the benzene nucleus by 1 or 2 Hal and 1 or 2 aliphatic groups and in which the

6-position is unsubstituted or the benzene nucleus is fully substituted, e.g. 2-allyl-4,6-dichloro-3,5-dimethylphenol, have excellent bactericidal and fungicidal properties. They are particularly useful in soaps, synthetic plastics, and rubber. C.O.C.

Synthetic Tanning Agents

FBY BP 845,644 (Germany 2 Feb 1957)

Mono- or di-hydroxyphenols are condensed with HCHO in presence of an alkali-metal hydroxide (0.2–0.5 mol./mol. phenol). The mass is then neutralised with SO_2 and condensed further at pH 5–7 until a water-soluble product X is obtained. This method overcomes all the disadvantages of earlier ones, e.g. removal of large amounts of inorganic salts, high alkali consumption, formation of large amounts of monomeric phenylmethanesulphonic acids, reactions under pressure, leading to uneven products, and gives products not requiring further processing. Reaction is generally rapid; e.g. X from crude cresol is formed in 45 min., both stages being exothermic and requiring only slight heat in the final stages. A.T.P.

Compatible Mixture of Polyvinyl Chloride and Polychlorobutadiene for Use as Coatings

Deutsche Gold- und Silber-Scheideanstalt

BP 845,731 (Germany 5 Oct 1956)

Polymerised 2-chlorobuta-(1,4)-diene and polyvinyl chloride are masticated together and solvent is added. The resulting mixture can be applied by brushing, dipping, spraying, or spreading. C.O.C.

Coating Compositions and Textile Finishes

K. H. Armstrong

BP 846,554 (3 Dec 1956)

A coating composition comprises a mixture of a vinyl acetate polymer and 3–10% (on wt. of polymer) of a water-soluble amino-aldehyde condensate which when cured becomes an insoluble, infusible resin. It has a wide range of uses including the coating of solid surfaces, cloth and paper. C.O.C.

Organopolysiloxane Coating Compositions

ICI

BP 844,780 (5 June 1957)

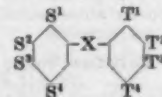
A composition has as its main component a mixture of 50–99% of an organopolysiloxane having 1.98–2.05 organic groups per Si atom and viscosity at 20°C. from 0.1×10^2 to 1.0×10^2 cs, 1–50% of a similar organopolysiloxane but having viscosity at 20°C. < 2.0×10^2 cs, and > 10% of a curing catalyst. Fillers and pigments may form other components of the composition. It may be applied by simple knife coating, e.g. to glass fabric, to yield a product of improved properties at high temperatures. C.O.C.

Polynuclear Phenols—Anti-oxidants

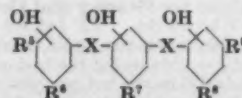
Distillers Co.

BP 845,608 (19 Dec 1957)

Alkoxy subst. dinuclear phenols (I)



(either $S^1 = T^1 = OH$, $S^2 = OR^1$, $S^3 = T^2 = H$, $S^4 = R^1$, $T^2 = OR^2$ and $T^4 = R^2$ or $S^1 = T^1 = H$, $S^2 = R^2$, $S^3 = T^2 = OH$, $S^4 = OR^1$, $T^4 = R^1$ and $T^3 = OR^2$) and trinuclear phenols (II)



(R^1 to $R^6 = \text{Alk of 1-9 C}$; at least one of $R^4-R^6 = \text{alkoxy of 1-9 C}$, the others Alk of 1-9 C ; $X = \text{methylene, ethyldiene, iso-propyldiene or S}$) are anti-oxidants for polymeric materials. A.T.P.

s-Triazine Derivatives—Reactive Dyes, Mordants, Fluorescent Brightening and Finishing Agents (IV p. 700)

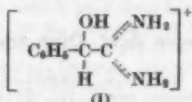
Effect of Surfactants on Swelling and Gel Properties of Wheat Starch (XI p. 709)

IV—RAW MATERIALS; INTERMEDIATES; COLOURING MATTERS

Complexes formed by α -Hydroxyamidines with Transition-metal Ions

R. O. Gould, R. F. Jameson, and D. G. Neilson
Proc. Chem. Soc. (Sept 1960) 314-315

The properties of α -hydroxyamidines as chelating agents have not hitherto been investigated, and it is now found that only the α -cpd., $\text{HO-CPhK-C}(\text{NH})\text{-NH}_2$ (where $\text{R} = \text{H}$, CH_3 , or C_6H_5), give bright pink complexes with nickel whereas their β -isomers and those without a hydroxyl group, such as phenylacetamidines, fail to do so. Similarly only the α -cpd. give deep blue complexes with bivalent copper. Since pH titration data indicate the mandelamidinium ion (I) to be a weak dibasic acid, the second ionisable hydrogen being located on the hydroxyl group, the formation of a five-membered ON-chelate ring is feasible and is now postulated for the copper and nickel complexes. The above pink complexes are diamagnetic, which suggests a square-planar arrangement in the solid, and they are only sol. in strong donor solvents; in soln. they are possibly octahedral involving, perhaps, solvent mol.



H.H.H.

Structure of Pyridone Cations

A. R. Katritzky and R. A. Y. Jones

Proc. Chem. Soc. (Sept 1960) 313-314

Previous work (*Chem. and Ind.* (1960) 870) had shown that nuclear magnetic resonance spectra of pyridones in H_2SO_4 supported O-protonation, although exchange of the labile protons occurred quickly and they could not be distinguished from those of the solvent. Since then Spinner has concluded (cf. *J.C.S.* (1960) 1226) that proton addition to pyridones and their analogues occurred at N rather than O. Results are now reported for several pyridone and pyridine hydrochlorides in SO_2 as solvent which cannot support N-protonation, e.g. hydroxyl peaks are found as strong singlets and N-proton peaks are absent. It is argued that these results apply generally.

H.H.H.

Directions of Transition Moments of Absorption Bands of Polyenes, Cyanines and Vitamin B₁₂ from Dichroism and Fluorescence Polarisation

R. Eckert and H. Kahn

Z. Elektrochem., **64** (1960) 356-364

Chem. Abs., **54** (25 July 1960) 13856

According to Zechmeister, polyenes with *cis* conformation show in addition to the long-wavelength main band A and the short-wavelength band C a band (*cis* peak) B absent in all-*trans* polyenes, and it is to be expected that the transition moments of the A and C bands are parallel, and that of the B band perpendicular to the lengthwise molecular axis. This prediction is tested by measuring the dichroism of stretched polyethylene film containing dissolved β -carotene (C.I. 75130) and 15,15'-*cis*- β -carotene. As dye molecules are preferentially oriented parallel to the direction of stretch the dichroism of the A and C bands should have positive sign (i.e. that light with the electron vector parallel to the direction of stretch is preferentially absorbed), and that of the B band, negative sign. This expectation was confirmed by experiment. Similar confirmation of such predictions was found for compounds having linearly extended π -electron systems, e.g. benzothiazole methin. Further confirmation was provided by the polarisation of the fluorescence spectra of stretched films and viscous solutions of polythiophene at room and liquid nitrogen temperatures. The degree of polarisation of the fluorescence is constant in all parts of the fluorescence band at constant exciting wavelength indicating that the direction of the fluorescence-determining transition moment is virtually unaffected by molecular vibration.

C.O.C.

Absorption Spectra and Basicity of Phenanthrolines and Related Compounds

H. H. Penkampus and H. Köhler

Z. Elektrochem., **64** (1960) 365-373

Chem. Abs., **54** (25 July 1960) 13856

The pH dependence of the absorption spectra of seven

phenanthrolines and several related compounds is given. Comparison with spectrum of phenanthrene shows that the effects of the hetero N atoms are less specific than, e.g. in the naphthalene-quinoline system.

C.O.C.

Kinetics and Mechanism of Diazotisation. XVI—Kinetics of the Reactions of Hydrated Nitrosyl Ion and of Nitrogen Trioxide with Diazotisable Amines

H. Schmid and C. Essler

Mh. Chem., **91** (30 June 1960) 484-499

Diazotisation data are reported for aniline at 15°C. and 25°C. to supplement the previous results at 0°C. (cf. *J.S.D.C.*, **75** (1959) 614; **76** (1960) 368); new data are also included for *o*-, *m*-, and *p*-chloroaniline and for *o*-, *m*-, and *p*-toluidine at 0°C. and 25°C. in perchloric acid. The rate constants are then computed for the reactions with the hydrated nitrosyl ion on the one hand and with nitrogen trioxide on the other, and compared with previous data for reactions with nitrosyl chloride. The rapidly increasing rate is in the order $\text{N}_2\text{O}_3 < \text{NOCl} < \text{H}_2\text{O-NO}$, a series which indicates that the rate of nitrosation of aromatic amines increases with the magnitude of the equilibrium const. of the hydrolysis of the nitrosating agent to hydrated nitrosyl ion; on analogy with the term "acid strength", this const. is designated "nitrosating strength". It is shown that nitrous acid does not act as a nitrosating agent. At 25°C. the order of magnitude of the rate const. of nitrosation by hydrated nitrosyl ion is $\sim 10^{10} \text{ sec.}^{-1}$.

H.H.H.

Volume Change of Activation in the Decomposition of Aromatic Diazonium Salts

K. R. Brower

J. Amer. Chem. Soc., **82** (5 Sept 1960) 4535-4537

Rates of evolution of nitrogen from aq. soln. of benzenediazonium fluoroborates and *p*-NO₂, *p*-CH₃, *p*-CH₃O-, *p*-Cl, *p*-SO₃-, *m*-NO₂ and *m*-Cl deriv. have been measured at pressures up to 1360 atm. Volume changes of activation were calculated from $RT(\partial \ln k / \partial P)_T = -\Delta V^\ddagger$, in which k is the reaction rate constant and ΔV^\ddagger the change in molar vol. resulting from transformation of one mole of reactant into activated complex. Values of ΔV^\ddagger are nearly equal and surprisingly large. It is suggested that the leaving group is very large and does not move independently of its water of solvation. Decomp. of *p*-NO₂ deriv. ion in presence of bromide ions leads to a product ratio of *p*-nitrobenzene to *p*-nitrophenol insensitive to pressure; involvement of a bimolecular process is doubtful.

F.J.

The Coupling Activity of Some Heterocyclic Diazo Compounds

J. Goerdeler, H. Hanbrich, and J. Galinke

Chem. Ber., **93** (1960) 397-405

Chem. Abs., **54** (25 June 1960) 12118

Heterocyclic amines dissolved in H_2PO_4 , cooled and diazotised with NaNO_2 , sometimes with addition of H_2SO_4 , were coupled with aromatic hydrocarbons (e.g. mesitylene) and phenol ethers (e.g. phenetole). Derivatives of 1,2,4- and 1,3,4-thiadiazole showed particularly high coupling reactivity.

E.S.

Aromatic Diazo- and Azo-compounds

XXXIII—Acylation and Diazotisation of *p*-Phenylenediaminesulphonic Acid. Influence of Seeding on the Reaction

J. Jarkovský and Z. J. Allan

Collection Czechoslov. Chem. Commun., **24** (1959), 3739-3745 (in German)

Chem. Abs., **54** (25 Apr 1960) 7618

Refluxing *p*-phenylenediaminesulphonic acid (I) with acetic acid and anhydride gives 2-acetyl-amino-5-aminobenzoic acid; formic acid gives 5-formyl-amino-2-aminobenzenesulphonic acid, although seeding with 2-formyl-amino-5-aminobenzenesulphonic acid results in the latter being the main product of reaction. Diazotisation of I gave a mixture of both isomeric diazo compounds in proportions depending on the acidity of the medium.

XXXIV—Cleavage of the Acetyl Group in Azo Dyes Derived from Acetanilide, and Preparation of New Formazan Dyes

J. Poskočil and Z. J. Allan

Ibid., **3746-3753**

Chem. Abs., *loc. cit.*, 7619

The monoazo compound *p*-hydroxyphenylazo-*o*-acetanilide is dissolved in aq. NaOH and air is blown

through, producing, apparently, 1-phenyl-3,4-bis(*p*-hydroxyphenylazo)maleimide. *o*-Hydroxyphenylazo-*o*-acetanilide in aq. NaOH, treated with 1-diazo-2-naphthol-4-sulphonic acid and then boiled with aq. CuSO₄ and acetic acid gives the Cu-complex of *N*-*o*-hydroxyphenyl-*N'*-(2-hydroxy-4-sulphonaphthyl)-*C*-carbanilinoformazane. This compound and its derivatives dye cotton, wool, and nylon. E.S.

Diphenylamine as a Coupling Agent

Tun T'ao and Hsing Yün Yü

Yao Hsueh Hsueh Pao, 7 (1959) 228-233

Chem. Abs., 54 (10 June 1960) 10912-10913

Diphenylamine is an excellent coupling agent for the identification of aromatic amines. Coupling takes place in acidic medium to give dyes of the Tropaeolin 00 type, red in acid soln. or oxidised state (excess of HCl or ArNH₂), and yellow in alkaline soln. or reduced state (excess of NaOH or NaNO₂). Details of the test and the results with various *p*-substituted aromatic amines are given. The reversible colour change in acid soln. with NaNO₂ shows diphenylamine to be a useful oxidation-reduction indicator. P.B.S.

Azo Dyes formed by Oxidative Coupling

IX—Coupling Activity of 1-Methyl- α -hydrazinoquinolium Salts towards 1-Naphthol

S. Hünig and H. Werner

Ann., 628 (1959) 46-55

Chem. Abs., 54 (10 June 1960) 11480

Six 1-methyl- α -hydrazinoquinolium chloride hydrochlorides ($\alpha = 2-7$) were prepared and their *pK* values determined. Oxidative coupling with α -naphthol in dimethylformamide, using K₂Fe(CN)₆, gave monoazo compounds, and the yields were estimated colorimetrically with reference to the products obtained by condensation with 1,4-naphthoquinone.

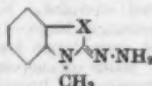
X—Coupling Activity of Heterocyclic *N*-Methyl-2-hydrazones towards Phenol

S. Hünig and H. Balli

Ibid. 56-68

Chem. Abs., 54 (10 June 1960) 11481

Heterocyclic *N*-methylhydrazones—



(X = Se, S, CH=CH, NCH₃; also the 4,5,6,7-tetrahydro derivative when X = S) were oxidatively coupled with phenol, and yields compared colorimetrically with those obtained by condensation with benzoquinone.

XI—Coupling Activity of Heterocyclic *N*-methyl-2-hydrazones towards Dimethylaniline, and XII, towards Aromatic Amines

S. Hünig and H. Nöther

Ibid., 69-75, 84-91

Chem. Abs., 54 (10 June 1960) 11482

A similar series of experiments condensing the same compounds with dimethylaniline and with aniline in presence of oxidising agents to give monoazo compounds.

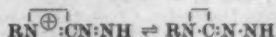
XII—Mechanism of the Reaction

S. Hünig, H. Balli, H. Nöther, and H. Geiger

Ibid., 75-83

Chem. Abs., 54 (10 June 1960) 11483

The coupling species of the heterocyclic hydrazones is represented by the cation—



Experimental evidence in support of this theory is described. E.S.

Effect of Steric Factors on the Properties of Dyes Containing the Biphenyl Nucleus

VII—Azo Dyes—Derivatives of Diphenic, Biphenyl-2-carboxylic, and Fluorenone-4-carboxylic Acids

B. M. Krasovitskii and T. A. Serova

Uchenye Zapiski Khar'kov Univ., 76 (1956) 149-155

Chem. Abs., 54 (10 June 1960) 11484

Disazo dyes were prepared by tetrazotising the *p*-aminoanilides of 7-aminofluorene-4-carboxylic (I), 4-amino-diphenic, and 4-amino-biphenyl-2'-carboxylic acids, and coupling with H acid. I, which has the most planar configuration, gives the most substantive dyes.

XII—Affinity for Cotton of Certain Disazo Dyes Containing Amide Groups

B. M. Krasovitskii and B. I. Ostrovskaya

Ukrain. Khim. Zhur., 25 (1959) 493-496

Chem. Abs., loc. cit.

In a series of such dyes that the longer the chain of aryl groups between the amide linkages the greater the affinity, *para* location of substituents is preferable.

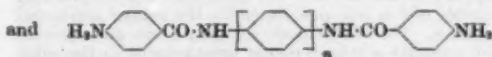
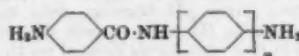
XIII—Disazo Dyes from *p*-Aminobenzoyl Derivatives of 4,4'-Diamino-*p*-terphenyl

N. I. Titarenko and B. M. Krasovitskii

Ibid., 617-619

Chem. Abs., loc. cit.

Two series of diamines, viz.—



(*n* = 1 to 3) were tetrazotised and coupled with H acid to give direct dyes whose substantivity increased with increase in *n*. E.S.

Structure of Disazo Acid Dyes and their Dyeing Properties

B. M. Bogoslovskii and E. N. Anishechuk

Tekhnol. tekstil. prom., No. 3 (16) (1960) 122-129

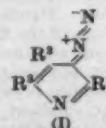
Dyeing properties, e.g. rate of dyeing, dye uptake, change of acidity of dyebath during dyeing, of 24 symmetrical acid disazo dyes on wool have been related to the structure of the diazo and azo components. Presence of an uninterrupted system of conjugated double bonds between azo groups reduces dyeing rate and decrease in acidity of the dyebath, but favours dye uptake. Position of sulphonic acid groups relative to amino groups has a very marked effect, e.g. 1,6-naphthylaminosulphonic acid deriv. increase rate of dyeing and dye uptake, whereas 1,7-deriv. have the opposite effect. G.J.K.

3-Diazopyrroles

J. M. Tedder and B. Webster

J.C.S. (Aug 1960) 3270-3274

Three methods are described for the synthesis of 3-diazopyrroles (I), viz. (a) normal diazotisation of the 3-aminopyrrole (cf. Angelico, *Atti R. Accad. Lincei*, 14 (1905) II, 167), (b) direct introduction of the diazo group with nitrous acid (cf. Tedder and Theaker, *J.C.S.* (1958) 2573), and (c) a two-stage process analogous to (b) in which the intermediate nitroso-pyrrole is isolated and then treated with nitric oxide; (b) and (c) were only successful with pyrroles in which the α -positions were blocked and attempts to make 2-diazopyrroles have so far failed. Method (b) with 2,5-diphenylpyrrole afforded two diazo cpds., viz. 3-diazo-4-nitro- and 3-diazo-2,5-diphenyl pyrrole, the former (I; R¹ = R³ = Ph, R² = NO₂) predominating; since (b) is invariably accompanied by formation of nitrate, the concurrent nitration is thereby explained. The diazopyrroles are converted into diazonium salts by mineral acids, but these failed to couple, even with resorcinol, in acidic media. Azo dyes may be prepared, however, by adding the diazopyrroles to fused β -naphthol or by refluxing a neutral solution of β -naphthol with the diazo cpd. All the diazopyrroles are slowly decomp. by light and afford a strong sharp infrared band at 2080-2150 cm⁻¹; they are all yellow or yellow-brown and cryst. and absorb at between 320 and 400 m μ .



H.H.H.

Studies of Absorption Spectra of Dyes. X—Effect of Wet- and Dry-heating on Spectra of some Azoic Dyes

Y. Ishii

J. Soc. Textile Cellulose Ind. Japan,

16 (Aug 1960) 662-667

Dyes from the dye components Fast Orange GC Base (C.I. Azoic Diazo Component 2), Fast Red Base (C.I. Azoic Diazo Component 5), Fast Red RL Base (C.I.

Azoic Diazo Component 34), Fast Bordeaux GP Base (C.I. Azoic Diazo Component 1), Fast Scarlet G Base (C.I. Azoic Diazo Component 12), Naphthol AS (C.I. Azoic Coupling Component 2), and β -naphthol (C.I. Azoic Coupling Component 1) were developed in Cellophane and polyvinyl alcohol films. Absorption spectra were measured before and after steaming, soaping, and boiling in water. The absorption max. of the dye formed from Fast Red RL and Naphthol AS showed a bathochromic shift; that of dye from Fast Red B and Naphthol AS showed a hypsochromic shift. Other max. were unaltered, but optical densities were increased. Original spectra were restored on dry-heating to near m.p. of dyes, i.e. 250–300°C. Spectral changes may be due to aggregation or dispersion of lakes in the films. M.T.

New Black Dyes for Cellulosic Fibres

A. G. Emel'yanov

Tekstil. prom., 20, No. 8 (Aug 1960) 38–41

A solubilised sulphur and two black azoic dyes are described, the latter, being the zinc chloride salts of 4,4'-diaminodiphenylamine (Diazole Black C) and of the coupling product of *p*-nitraniline with dimethoxyaniline (Diazole Black K), which give deep blacks with Azotol A. The sulphur dye is an ordinary sulphur black paste solubilised with bisulphite. Dyeing and printing recipes are given. In general, fastness properties are moderate, those to wet rubbing very poor. G.J.K.

Absorption Spectrum of Some Triarylmethane Dyes

C. Albu

Anale Univ. "C.I. Parhan" Bucuresti, Ser. chim., 21 (1959) 55–64 (French summary)

Chem. Abs., 54 (25 July 1960) 13855

As a bathochromic effect was observed in triarylmethane dyes of the Malachite Green (C.I. 42000) class on introduction of a furan ring, other dyes of the acridine and xanthene classes were studied. Introduction of a furan ring into acridine dyes causes a partial bathochromic effect because of the closure of the heterocyclic ring. With xanthene dyes, however, it increases the hypsochromic effect considerably. As furan causes a bathochromic effect with N-containing rings and a hypsochromic effect with O-containing rings, it is probable that in presence of another hetero atom, e.g. S, the effect of furan is slight or nil and consequently the absorption maximum is not displaced. C.O.C.

Deep Colour of 9-Substituted Acridines. III—Planarity of these Compounds and Constitution of 9-Hydroxyphenyl- and 9-Hydroxystyryl-acridine

V. Zanker and A. Peichel

Z. Elektrochem., 64 (1960) 431–437

Chem. Abs., 54 (25 July 1960) 13855

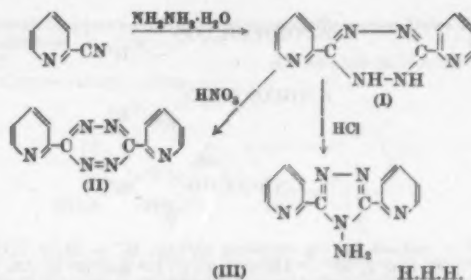
Absorption and fluorescence spectra are given of 9-R-acridine ($R = p\text{-C}_6\text{H}_4\text{OH}$, $p\text{-C}_6\text{H}_4\text{OCH}_3$, $p\text{-CH}_3\text{CH}_2\text{CH}_2\text{OCH}_3$, $p\text{-CH}_3\text{CH}_2\text{CH}_2\text{N}(\text{CH}_3)_2$, $p\text{-CH}_3\text{CH}_2\text{CH}_2\text{N}(\text{CH}_3)_2$, $p\text{-CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$, and $\text{CH}_3\text{CH}_2\text{N}(\text{CH}_3)_2$). Bands which occur between 32,000 and 38,000 cm^{-1} are attributed to the R group. This demonstrates that in the ground state, the R and acridine groups are strongly twisted relative to each other and that electronic interference is weak. The coplanar state is believed to be reached only after absorption in the long-wavelength charge-transfer band. Comparison of the hydroxy cpd. with the corresponding methoxy cpd. shows that in neutral solution they exist in the hydroxy form but when $R = \text{OH}$ the cpd. in neutral solution exists as betaine. C.O.C.

Preparation of the 1,2,4,5-Tetrazines of Pyridine and of Methylenedioxybenzene

F. Dallacker

Mh. Chem., 91 (29 Apr 1960) 294–304

Pyridine-(2-), -(3-), -(4-), and 3,4-methylenedioxybenzo-nitrile, when treated with hydrazine hydrate give the respective 1,2-dihydro-1,2,4,5-tetrazines (I), which are oxidised by HNO_3 to the corresponding 1,2,4,5-tetrazines (II) and also converted by N-HCl into the 3,5-disubstituted 4-amino-1,2,4-triazoles (III). The 1,2-dihydro-1,2,4,5-tetrazines are respectively golden yellow, orange, orange, and yellow in colour, and their corresponding oxidation cpd. are blood red, blue-red, violet, and dark red. The reactions are schematically for pyridine-2-nitrile as follows—



Studies on Leuco-compounds of the Anthraquinone Series. II—Kinetics of Isomerisation of Anthranol to Anthrone

Y. Banaho and K. Nukada

Repts. Govt. Chem. Ind.

Research Inst. Tokyo, 55 (July 1960) 230–234

In organic solvents, anthranol isomerises to anthrone, equilibrium eventually being set up. Pure anthranol was prepared and the rate constants of isomerisation were measured analytically and by a dielectric method. The calculated heats of activation in methanol, ethanol, benzene and toluene, respectively, were 5.8, 12.4, 12.2 and 4.8 kcal./mol. M.T.

Correlation between Colour-fastness and Structure of Anthraquinone Blue Disperse Dyes

V. S. Salvin and R. A. Walker

Text. Research J., 30 (May 1960) 381–388

Any structural modification which reduces the electron density on the amino N atom attached to the anthraquinone ring, whether it is an amino, alkylamino or aryl-amino N atom, increases resistance to the electrophilic agents responsible for the chemical changes which occur during fading caused by gas, ozone or light. Several dyes of improved resistance to fading are given. They contain as substituents in the arylamino radical, groups which withdraw electrons from the aromatic ring, leaving the amino N atom with low electron density. C.O.C.

Use of Metal Complexes in Organic Dyes and Pigments

O. Stallmann

J. Chem. Educ., 37 (1960) 220–230

Chem. Abs., 54 (25 July 1960) 14693

Review, 80 references. C.O.C.

Pigments for Cement

E. Herrmann

Betonstein Ztg., 26 (1960) 110–113

Chem. Abs., 54 (25 July 1960) 14623

The chemical composition, resistance to heat and acid, and fastness to light of 15 inorganic pigments suitable as cement pigments are given. C.O.C.

Zircon Pigment. III—Praseodymium Yellow

E. Kato and H. Takashima

Nagoya Kogyo Gijutsu

Shikensho Hokoku, 5 (1956) 147–150

Chem. Abs., 54 (25 July 1960) 14718

Zircon pigments are obtained by firing a mixture of ZrO_2 , SiO_2 , Na_2MoO_4 , NaCl and a small amount of a metallic compound at 1100°C. When Pr_2O_3 is used as the metallic compound an excellent yellow pigment is obtained resembling Cadmium Yellow (C.I. Pigment Yellow 37). La_2O_3 and Ce_2O_3 do not yield a coloured pigment. Nd_2O_3 yields a pale purple and Di_2O_3 a pale yellow. Praseodymium Yellow has remarkable absorptions at about 450 and 480 m μ , which are the typical ones for a yellow pigment. Neodymium Yellow has characteristic absorptions at about 530 and 580 m μ . C.O.C.

Properties of Graphite (C.I. 77265). I—Preparation, Structure and Mechanical Properties

L. C. F. Blackburn

Research, 13 (Oct 1960) 390–397

Review, 58 references. C.O.C.

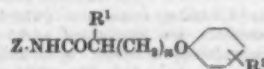
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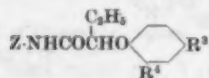
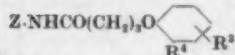
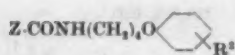
Colour Couplers

Kodak

BP 843,497 (U.S.A. 2 Dec 1955)

Compounds of formulae—





(Z = radical having coupling ability; $\text{R}^1 = \text{H}$ or C_2H_5 ; $n = 0, 1$ or 2 ; $\text{R}^2 = \text{Alk}$ of $7-15 \text{ C}$; R^3 and $\text{R}^4 = \text{Alk}$ of $1-18 \text{ C}$ and together are of $6-23 \text{ C}$) are colour complexers of lower m.p. than those hitherto available and so have reduced tendency to crystallise in photographic emulsions. They are more soluble in organic solvents than hitherto known complexers and so can be used in higher concentrations. In addition they have reduced tendency to diffuse in the emulsion. C.O.C.

2-Azo-1-naphthol Colour Couplers

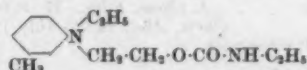
Kodak BP 850,610 (U.S.A. 28 Sept 1956)

2-Azo-1-naphthol dyes which are not substituted in the 3- or 4-positions react with the oxidation products of colour developers to yield yellowish to brown or practically neutrally coloured products of low tinctorial power and not the cyan dyes as occurs with the 4-azo-1-naphthols. They can be used to provide masking images having a wide variety of colours. C.O.C.

Tertiary Amines—Intermediates for Azo and Styryl Disperse Dyes and Pigments

S BP 845,220 (Switzerland 18 July 1956)

Alkyl, cycloalkyl, and aryl isocyanates are condensed with tertiary arylamines having an *N*-hydroxyalkyl or *N*-aminoalkyl group to give the title products. They couple with suitable diazo compounds to give disperse dyes (BP 824,443, J.S.D.C., 76 (1960) 128), or by introducing a *p*-CHO group and condensing with compounds containing reactive CH_2 groups, styryl dyes are formed (BP 843,643 and 843,644). Thus *N*-ethyl-*N*-hydroxyethyl-*m*-toluidine is boiled under reflux with benzene and ethyl isocyanate to give the ethylcarbamate ester—

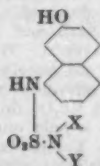


A list of 188 such compounds is given, and includes the colours in acetone of the monoazo dyes obtained by coupling diazotised *p*-nitroaniline on to each of them. E.S.

Metallisable Monoazo Dyes for Wool, etc.

FBy BP 847,434 (Germany 20 Apr 1957)

o-Aminophenols (or their ethers or esters) free from SO_2H and COOH groups are diazotised and coupled with derivatives of 1-aminosulphonylamino-7-naphthol—



(X and Y = Alk, or may be joined together to give a heterocyclic ring) to give monoazo compounds which may be metallised, preferably with Cr or Co compounds, in substance or on the fibre. Thus 2-aminophenol-4-sulphonamide is diazotised and coupled with 1-(dimethylamino)sulphonylamino-7-naphthol in presence of NaOH and aq. ammonia. The product is a bluish grey metachrome dye, while its 1:2 Cr-complex dyes wool bluish green. E.S.

Orange and Red Monoazo Disperse Dyes having Alkylsulphonyl Groups

ICI BP 847,175 (20 June 1958)

4-Alkylsulphonyl-2-halogenoanilines (which may have Hal in the 5-position) are diazotised and coupled with suitable *NN*-dialkylated anilines, *m*-toluidines, or *m*-aminobenzotrifluorides to give the title dyes. Thus

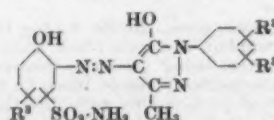
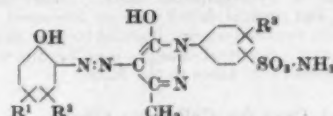
2-chloro-4-ethylsulphonylaniline diazotised and coupled with *NN*-di(5-hydroxyethyl)-*m*-toluidine gives a scarlet for cellulose acetate and nylon. Outlines for syntheses of the diazo components are given. E.S.

Metal(Cobalt)-complex Monoazo Pyrazolone Dyes for Wool, etc.

LBH

BP 844,873 (4 July 1957)

The complexes containing 1 atom of Co to 1 mol. of each of 2 monoazo compounds—



and

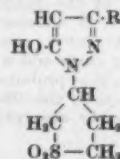
($\text{R}^1, \text{R}^2 = \text{H}, \text{Hal}, \text{NO}_2$, or Alk; $\text{R}^3 = \text{H}, \text{Hal}$, or Alk) dye wool, nylon, etc. mainly browns from neutral or weakly acid baths. Thus a mixture of the monoazo compounds 2-aminophenol-4-sulphonamide-1-(3',4'-dichlorophenyl)-3-methyl-5-pyrazolone and 2-amino-5-nitrophenol-1-*m*-sulphamylphenyl-3-methyl-5-pyrazolone heated in presence of NaOH with aq. CoCl_2 gives a reddish brown. E.S.

Yellow and Orange Monoazo Pyrazolone Disperse Dyes

FBy

BP 847,181 (Germany 21 Aug 1957)

Suitable diazo compounds are coupled with 1-(tetrahydrothiophene-1'-dioxide-[3])-5-pyrazolones—



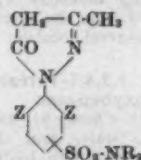
($\text{R} = \text{H}, \text{Alk}, \text{Ar}, \text{COOAlk}$, or an alkylene carboxylic acid ester group) to give the title dyes, which are particularly suitable for polyethylene terephthalate fibres. These coupling compounds are made by condensing esters or amides of β -keto acids with 3-hydrazinotetrahydrothiophene-1-dioxide obtained by adding hydrazine to butadiene sulphone. Thus diazotised 2-chloro-4-nitroaniline is coupled with the compound in which $\text{R} = \text{methyl}$; the monoazo compound so formed dyes Terylene reddish yellow of good fastness to light and sublimation. E.S.

Metal(Chromium)-complex Monoazo Pyrazolone Dyes for Wool, etc.

FBy

BP 849,705 (Germany 7 Aug 1957)

Derivatives of *o*-aminophenol containing Hal, Alk, and/or nitro groups, and their *o*-alkyl ethers and esters, are diazotised and coupled with pyrazolones—

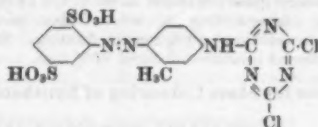


($\text{R} = \text{H}$ or Alk; $\text{Z} = \text{substituent other than } \text{SO}_2\text{H}$ or COOH) and the products converted into 1:2 Cr-complexes, which dye wool, nylon, etc., orange or red from neutral or weakly acid baths. Thus 2-amino-4-methyl-6-nitrophenol is diazotised and coupled with 1-(2'-chloro-6'-methyl-4'-sulphamylphenyl)-3-methyl-5-pyrazolone, and the monoazo compound so formed is boiled with aq. $\text{K}_2\text{Cr}_2\text{O}_7$ in presence of glucose to give the Cr-complex, which dyes wool red. E.S.

Reactive Monoazo Triazine Dyes

ICI BP 844,869 (5 June 1957)

Monoazo compounds A:N:N-B-NHR (A = benzene series radical containing 2 SO₃H and/or COOH groups; B = 1,4-phenylene, 1,4-naphthylene, or 6-sulpho-1,4-naphthylene and may contain CH₃ and/or OCH₃ but no other substituents; R = H, CH₃, or C₂H₅) are condensed with 1 mol. of a cyanuric halide to give the title dyes, which react with cellulose, wool, silk, and regenerated protein fibres in presence of alkalis. Thus the monoazo compound aniline-2,5-disulphonic acid-*m*-toluidine is condensed with 1 mol. of cyanuric chloride giving—



which is salted out and dried at 30°C. in presence of phosphate buffers. It gives reddish yellows on cellulose when dyed or printed under alkaline conditions.

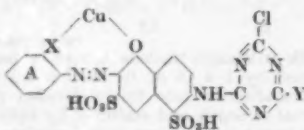
BP 844,870 (5 June 1957)

Similar dyes are obtained if A = a naphthyl radical containing two SO₃H groups neither of which is in the 8-position. Thus the monoazo compound 2-naphthylamine-3,6-disulphonic acid-*m*-toluidine condensed with 1 mol. of cyanuric chloride gives a reddish yellow. E.S.

Metal(Copper)-complex Monoazo Reactive Dyes for Cellulose

ICI BP 846,949 (4 Nov 1957)

Dyes of formula—



(A may contain Cl, NO₂, SO₃H etc. groups; X = O or COO; Y = NH₂, OCH₃, or anilino containing at least one SO₃H group) are prepared, e.g. by coupling a diazotised *o*-aminophenol, *o*-anisidine or anthranilic acid with 2-amino-5-naphthol-1,7-disulphonic acid (I), converting the resulting monoazo compound into its Cu-complex, condensing with 1 mol. of cyanuric chloride (II), and finally condensing with 1 mol. of NH₃, methanol or an aniline sulphonic acid. Thus the Cu-complex of the monoazo compound 2-aminophenol-4-sulphonic acid-I is condensed with 1 mol. of II, and the product is warmed with aq. metanilic acid in presence of Na₂CO₃ to give the dye in which X = O; Y = *m*-NH-C₆H₄-SO₃H. Applied to cotton in conjunction with an alkaline treatment it gives bluish reds fast to washing and bleaching. E.S.

Yellow Monoazo Pigment

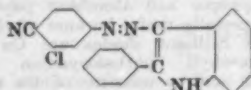
FH BP 844,777 (Germany 28 Apr 1956)

The monoazo compounds 2,5-dimethoxyaniline-4-sulphonbutylamide-*o*-acetoacet-2,4-dimethylanilide are greenish yellow pigments brighter, greener, and faster to overspraying when incorporated in nitrocellulose lacquers than the similar pigment 2,5-dimethoxyaniline-4-sulphon-*n*-butylamide-*o*-acetoacet-4-chloro-2,5-dimethoxyanilide described in BP 737,270 (J.S.D.C., 71 (1955) 753). E.S.

Monoazo Indole Disperse Dyes for Polyester Fibres

FBy BP 850,422 (Germany 26 June 1957)

Diazotised cyanoanilines, which may contain further non-solubilising substituents, are coupled with indoles free from SO₃H and COOH groups to give yellow, orange and red disperse dyes of good fastness to light and sublimation on polyethylene terephthalate fibres. Thus the monoazo compound 3-chloro-4-cyanoaniline-*o*-2-phenylindole—



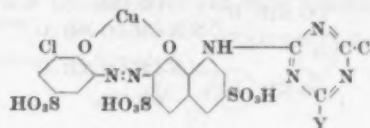
is a greenish yellow.

E.S.

Metal(Copper)-complex Monoazo Reactive Dyes for Cellulose

ICI BP 850,559 (4 Nov 1957)

Copper-complex dyes—

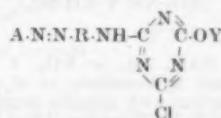


(Y = NH₂, OCH₃, OC₂H₅ or anilino which may contain one or two SO₃H groups) give violets on cellulose of good fastness to washing, bleaching, and light when applied in conjunction with an alkaline treatment. Thus 2-amino-6-chlorophenol-4-sulphonic acid is diazotised and coupled with an alkaline solution of H acid, and the resulting monoazo compound is boiled with aq. CuSO₄ to give the Cu-complex which is stirred with 4,6-dichloro-2-phenoxy-*s*-triazine to give the reactive dye (Y = OC₂H₅). E.S.

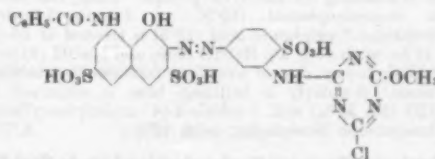
Mono- and Dis-azo Reactive Dyes for Cellulose

Ciba BP 847,635 (Switzerland 29 June 1956)

Dyes of general formula—



(Y = Alk of < 8 C, or benzene series Ar preferably containing SO₃H or COOH; R = radical of benzene series preferably containing SO₃H; A = residue of coupling component which contains SO₃H and may contain an azo link; at least two SO₃H groups per dye mol. are present) are particularly suitable for applying to cellulose by padding and fixation in presence of hot NaOH. If *oo'*-dihydroxy- or *o*-carboxy-*o'*-hydroxy-azo groups are present, the dyeings may be aftertreated with Cu compounds. Thus cyanuric chloride is dissolved in methanol and Na₂CO₃ added, whereby one Cl is replaced by OCH₃. A second Cl is then replaced by condensing with *m*-phenylenediamine-4-sulphonic acid, and the product is then diazotised and coupled with *N*-benzoyl-H acid, giving—



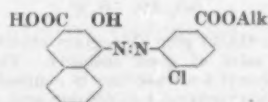
which dyes cotton bluish red.

E.S.

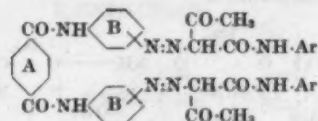
Disazo Pigments

Ciba BP 844,794 (Switzerland 11 Oct 1956)

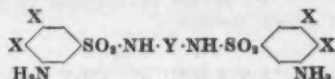
Two mol. of insoluble monoazo compounds containing a COOH group—



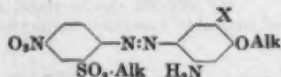
are converted into the corresponding acid halides and then condensed with 1 mol. of an aromatic primary diamine free from water-solubilising groups and containing only carbocyclic rings and at most four such rings, to give pigments of good fastness to solvents. Suitable diamines are e.g. *p*-phenylenediamine, benzidine, 2,8-diaminonaphthalene, and 4,11-diaminofluoranthene. Thus the monoazo compound ethyl 3-amino-4-chlorobenzoate-*o*-3-hydroxy-2-naphthoic acid is heated in nitrobenzene with SOCl₂ and the acid chloride so formed is condensed with benzidine in presence of pyridine to give a scarlet pigment for polyvinyl chloride. E.S.

Yellow Disazo PigmentsICI BP 849,376 (14 Mar 1958)
Disazo compounds of the type—

(benzene ring A may contain Hal atoms; B may contain substituents, e.g. Cl, Alk, OAlk, etc., and the amide and azo groups are in the *m*- or *p*-positions to each other) are yellow pigments of good light fastness. Thus tetrazotised *N,N'*-bis(4'-amino-2'-chlorophenyl)terephthalamide is coupled with an alkaline solution of acetoacet-*m*-xylylide to give a greenish yellow. E.S.

Disazo PigmentsFBy BP 847,546 (7 June 1957)
Yellow to bordeaux pigments of good fastness to solvents are made by tetrazotising diamines—

(X = H, Hal, OAlk, Alk, or NO₂; Y = residue of a saturated aliphatic hydrocarbon, or of a benzene series radical) and coupling with suitable coupling components free from SO₂H and COOH groups. Thus 1,2-bis(3'-amino-4'-methoxybenzenesulphonylamino)ethane tetrazotised and coupled with the 4-chloro-2,5-dimethoxyanilide of 3,2-hydroxynaphthoic acid is a red suitable for lacquers. E.S.

Water-soluble Azo and Anthraquinone Dyes Containing Methylol GroupsBASF BP 842,802 (18 May 1957)
The title compounds D-(CH₂OH)₂ (D = radical of azo or anthraquinone dye containing < 1 water-solubilising group, e.g. SO₂H or COOH or their amides, ureido, and alkyl, aryl, aralkyl or cycloalkylsulphone, in which the H atoms susceptible to reaction with HCHO have been replaced by 1-8 methylol groups, are suitable for dyeing natural and regenerated cellulose and polyamides. They have better washing fastness and affinities than the initial dyes containing no methylol groups. Thus, the azo dye from *m*-aminophenol (10·9) → 2-amino-5-hydroxynaphthalene-7-sulphonic acid (23·9) is treated at 15–20°C. for 24 hr. with 15% aq. HCHO (200) and NaOH (4) to give a reddish brown dye of excellent fastness to washing on cellulose. Similarly a brilliant blue is obtained from HCHO (50, 30%) and 1-amino-4-(4'-ureidophenyl)aminoanthraquinone-2-sulphonic acid (25). A.T.P.
***o*-Aminoazobenzene Derivatives and their Stabilised Diazo Compounds**FH BP 850,317 (Germany 9 May 1956)
o-Aminoazobenzene derivatives—

(X = Alk or OAlk) give diazonium chlorides, sulphates and double salts of good stability. Thus diazotised 2-methylsulphonyl-4-nitroaniline is coupled with the Na salt of 2-methoxytoluene-4-sulphamic acid, and the SO₂H group is then split off to give the *o*-aminoazobenzene derivative (X = Alk = CH₃). Treatment with nitrosylsulphuric acid then gives the diazonium sulphate which is salted out with Na₂SO₄ and dried at a moderate temperature. E.S.

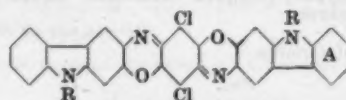
Improved Stability of Compositions of Dihalogeno-*s*-triazine CompoundsICI BP 842,933 (7 Aug 1957)
The rate of hydrolysis of compounds containing 4,6-dihalogeno-*s*-triazine groups is reduced, during manufacture and storage, by buffers maintaining pH 3–7, preferably 4·5–6·0. Mixtures of free acid and metal salt

of arylamino sulphonic acids, each amino group being NR₂ (R = same or different, subst. or unsubst. alkyl, cycloalkyl or aralkyl of < 2 C), e.g. *N,N*-diethylmetanilic acid are suitable buffers. If R = H or CH₃, hydrolysis is accelerated. Thus the dye paste from 1-amino-4-(4'-aminoanilino)anthraquinone-2,5',5'-trisodium sulphate (113·8) and cyanuric chloride (37·8) (cf. BP 781,930, J.S.D.C., 73 (1957) 524) is mixed in 10:1 ratio with buffer (obtained by dissolving *N*-ethyl-*N*-phenylbenzylaminemonosulphonic acid in water and adding NaOH to give pH 6·0 on dilution, evaporating, drying and grinding). The mixed paste, dried at 45°C., ground and kept in a sealed glass container at 60°C. for 14 days showed, on testing (determining % wt. of dye present which reacted with cellulose) 14% loss in fixation. Parallel tests with unbuffered mixtures showed 96% loss. A.T.P.

Styryl Dyes for Mass Colouring of Synthetic Polymer FibresS BP 843,645 (Switzerland 18 July 1956)
Styryl dyes containing no hydroxy group are soluble with fibre-forming polymers in organic solvents. The solution can be spun by either wet or dry spinning methods. They offer the advantage over pigments that they obviate incrustation of the filters or blocking of the spinnerets. They are stable to the temperatures used in melt spinning. C.O.C.
Pigments from Unsulphonated Oxazine Dye Bases

General Aniline USP 2,918,465 (3 Dec 1956)

Oxazine dye bases of formula—



(R = H, Alk or benzyl; nucleus A may be unsubstituted or substituted by 1–4 Cl or Br atoms) are readily and efficiently transformed into finely divided pigments of high tinctorial strength and stability by milling them in presence of a water-soluble organic hydroxylated compound for 8–48 hr. The products have 20–35% greater tinctorial strength than those obtainable by hitherto known methods and they are much redder. C.O.C.

Acid Milling of Phthalocyanine Pigments

General Aniline BP 843,051 (27 June 1957)

Improved pigments are obtained by milling with forces predominantly shearing in nature (preferably a Werner-Pfleiderer type kneading mill) a mixture of phthalocyanine pigment (1) and sufficient liquid aromatic sulphonic acid, e.g. *p*-toluenesulphonic acid, to produce a doughy, kneadable mass and finally diluting with water and separating by conventional methods. The process results in a yellowing of halogenated Cu phthalocyanines and gives improved particle size, particle size distribution and surface characteristics. Thus crude Cu phthalocyanine (7) (C.I. 74160) and *p*-toluenesulphonic acid (100) are milled in a kneading machine at 65–70°C. for 3 hr. The mass is diluted with water (1400), filtered and washed neutral to give a bright blue pigment suitable for use in printing inks, plastics and rubber. It has improved softness over conventional acid pasted products. A.T.P.

Phthalocyanine Dyes for Paper

ICI BP 844,338 (10 Apr 1958)

Paper is dyed at any stage of its manufacture with one or more water-soluble salts of aminomethyl phthalocyanines P(CH₂NR¹R²)_n and mono- or poly-basic acids (P = subst. or unsubst. stable metal phthalocyanine or naphthalocyanine; R¹ = H or aliphatic of 1–6 C; R² = aliphatic of > 6 C, or R¹ + R² form a heterocyclic ring; n = 2–8). The dyes have excellent brightness and are fast to light, water and bleach. They have good affinity and colour value for paper pulp, attainable without addition of sizing agent, and thus are suitable for high-grade blotting-paper and absorbent papers for plastic laminates. Especially useful because of their high H₂O-solubility and brilliant shades are Cu di- and tri-(diethylaminomethyl) phthalocyanine hydrochloride (greenish blue) and a mixture of Cu tri- and tetra-(diethylaminomethyl)-tetra(tolylmercapto)phthalocyanine (green). A.T.P.

s-Triazine Derivatives—Reactive Dyes, Mordants, Fluorescent Brightening and Finishing Agents

ICI BP 849,772 (21 Dec 1956)

Water-sol. organic compounds containing at least one s-triazine nucleus having SO_3H groups (as the alkali metal, alkaline earth or Mg salt) attached to at least one C atom of the triazine nucleus, are prepared by reacting the appropriate sulphite with an organic cpd. containing halogeno-s-triazinyl groups. Depending on the latter the products are colourless or coloured. The coloured products are reactive dyes for cellulosic fibres and the colourless ones, depending on the subst. on the triazine nucleus, are dye intermediates, mordants for basic dyes or fluorescent brightening agents, and are useful also in starch finishes and in improving the washing fastness of fibres coloured with mono- or unsubst. $-\text{NH}_2$ containing dyes. Thus the condensate of cyanuric chloride (14) and the disodium salt of the monoazo dye (38-4) 4-amino-3-sulphoanisole \rightarrow 2-methylamino-8-hydroxynaphthalene-6-sulphonic acid, is dissolved in water (2460) and acetone (60) and the solution added to Na_2SO_3 (19) in water (120) at $< 5^\circ\text{C}$. The mixture is stirred for 16 hr. while allowing the temperature to rise to 20°C ., and the product pptd. by NaCl (250). It contains 0.05 atoms organically bound Cl and 3.95 atoms S per azo group and dyes cotton a bright red of excellent washing fastness. A.T.P.

Cadmium Pigments

Johnson, Matthey & Co. BP 845,636 (24 Feb 1959)

Mixtures of cadmium and mercuric sulphides obtained in any manner may be calcined by the method described in BP 815,328 (J.S.D.C. 75 (1959) 472) to yield pigments. C.O.C.

Pigmentary Anhydrite (C.I. 77231) from Gypsum

National Lead Co. BP 848,617 (U.S.A. 26 Dec 1957)

Gypsum is made into a 20–50% aqueous slurry of particle size < 200 mesh. Anhydrite seed is prepared by adding 5–50% of the slurry to 74–80% H_2SO_4 at $< 70^\circ\text{C}$. at a rate of 0.0125–1.0 part gypsum (calc. as CaSO_4) for each part of H_2SO_4 (calc. as 60% B₄) per minute while maintaining the temperature at 20 – 80°C . The remainder of the slurry is then added and the mixture heated to 80 – 100°C . to convert all the gypsum into anhydrite. C.O.C.

Carbon Black (C.I. Pigment Black 6 and 7)

Columbian Carbon Co. USP 2,918,353 (11 July 1957)

Improved process of the type in which a hydrocarbon is separately and forcefully injected as an atomised liquid spray directly into a stream of hot blast flame gases passing through an elongated reaction chamber. It offers the advantage that coking on the chamber walls is prevented. C.O.C.

Carbon Black (C.I. Pigment Black 6 and 7)

Texaco Development Corp. BP 848,419 (15 Feb 1957)

Describes production of Carbon Black having apparent density of 0.3–1.0 lb./cu.ft. C.O.C.

Mixed Lead-Zinc Chromate Pigments

W. Glaser BP 845,873 (5 July 1956)

Mixed lead-zinc ore, preferably anglesite-cerussite-calamine ore, is heated with aqueous alkali until at least part of the crystalline carbonates, sulphates and silicates present have been converted to the corresponding amorphous basic form. The resulting solid is heated with chromic acid or chromate to yield a readily-extended yellow pigment which is preferably used mixed with Ferrocyanide Blue (C.I. Pigment Blue 27) as an extended green pigment. C.O.C.

Metal Chromates and Chromate Pigments

W. Glaser BP 845,874 (3 June 1957)

A water-insoluble solid material containing both MnO_2 and MnO , e.g. pyrolusite, is treated with chromic acid or a soluble chromate. The amount of the chromic acid or chromate does not exceed that required to react with the MnO alone. The product thus contains a double compound of MnO_2 and Mn chromate. It renders light metal, e.g. Al and its alloys, passive and protects them from corrosion. Part of the manganese-containing raw material may be replaced by Red Lead (C.I. Pigment Red 105) or a lead-containing raw material, e.g. galena, which has been roasted to convert some or all of the lead present into Pb_2O_3 in which case the amount of chromic acid used is such as to convert the MnO and Pb_2O_3 into chromates and leave the MnO_2 unaltered. C.O.C.

Blue Colloidal Silver Dispersions for Photographic Antihalo Layers

General Aniline BP 843,713 (U.S.A. 13 Feb 1957)

Rutile Titanium Dioxide (C.I. Pigment White 6)

Laporte Titanium BP 846,085 (3 Nov 1955)

TiO_2 , almost wholly in the rutile form is obtained by hydrolysing TiSO_4 in presence of a nucleating agent or seed, washing the precipitate and treating it with an aqueous solution of an ammonium compound of alkaline reaction to produce a product of pH 5–8. This is washed with water containing no Ca, Mg or silicate ions and then calcined to yield a pigment of good colour. C.O.C.

Vat Dyes

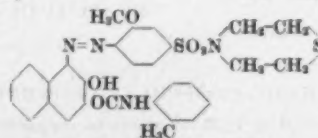
Ciba BP 844,405 (Switzerland 14 Aug 1956)

Vat dyes of good tinctorial strength are obtained in a soft-grained finely-divided non-dusting form by grinding the moist or dry crude dye with not less than its own weight of a water-soluble organic solvent, especially isopropyl alcohol until the desired physical state ($< 2\mu$) is reached. Solvent is removed by distillation or spray-drying. Where a moist cake is used, water is substantially displaced by solvent before grinding, which is preferably carried out in presence of dispersing agent. A.T.P.

Water-soluble Sulphonium Dyes

FBY BP 850,159 (Germany 16 Apr 1958)

The above are obtained by reacting pigments (I) containing < 1 subst. or unsubst. thiomorpholine residue, with a dialkyl sulphate or a trialkyloxonium boron fluoride. I may be based on tetrazaporphin, phthalocyanine, azo, anthraquinone, oxazine, etc., subst. by $-\text{SO}_2\text{Cl}$, and are obtained by condensing with thiomorpholine. They dye cellulose from a neutral bath, alkaline aftertreatment regenerating the insoluble sulphone thiomorpholide to give dyeings of excellent fastness to light, washing, perspiration and resistance to pleating and ironing. Thus, the azo dye (10)—



is stirred 1 hr. at 90 – 100°C . with $(\text{CH}_3)_2\text{SO}_4$ (60) and the sulphonium salt (12) pptd. with acetone. It dyes cotton bright red. A.T.P.

Pigment Compositions

Fabriques de Produits Chimique de Thann et de Mulhouse BP 847,007 (France 28 Mar 1957)

Pigments are made more organophilic and more hydrophobic by adding to their aq. dispersions an alkali metal salt of a higher fatty acid, resinic acid, or a naphthenic acid, or a stable aqueous emulsion of a mono- or di-subst. polyorganosiloxane whose units are—



(X and Y = Alk, Alkaryl, Aralkyl, Ar, or alkenyl; X may = H), and then adding a soluble metal salt of Al, Mg, Zn, Ti, Zr, rare earth, Sn, Sb or Pb, capable of depressing the action of the dispersing agent. A colourless insol. coating is formed on the pigment. The products are useful in paints, printing inks, plastics, synthetic fibres, cosmetics and pharmaceuticals. A preferred use is to produce a TiO_2 pigment of high tinctorial strength, excellent brightness, exceptional resistance to chalking, to yellowing by light and to baking discoloration, by dispersing calcined and milled rutile (C.I. 77891) in 0.03–3% aq. Na silicate, adding 0.1–0.5% of a polyorganosiloxane and then, e.g. $\text{Al}_2(\text{SO}_4)_3$ (0.2–3% Al_2O_3), neutralising, separating, and washing. A.T.P.

Pigment Pastes

Gy BP 844,751 (17 Mar 1956)

Pigment pastes containing up to 75% of highly dispersed pigment are obtained by kneading a substantially dry organic pigment (including Carbon Black) with a liquid non-ionic surfactant, e.g. Lissapol NX, to give a substantially anhydrous paste (cf. BP 841,519 (J.S.D.C., 76 (Sept 1960) 566). The optimum ratio of pigment to

non-ionic agent depends on the viscosity of the mixture and on the ability of the pigment to absorb the agent. As the surfactants contain both oleophilic and hydrophilic groups and coat each pigment particle, the pastes can be used directly in a wide range of aqueous and organic systems, e.g. oil paints and varnishes, polystyrene emulsions, aq. polyvinyl acetate, rubber latex, gravure inks based on aromatic hydrocarbons, etc. Colour values and degree of dispersion at least equal to those resulting from conventional grinding or milling processes are obtained.

A.T.P.

Thermoplastic Resins and Derived Pigments

Switzer Brothers BP 845,462 (U.S.A. 14 Oct 1957)

Pigments are obtained by dispersing or dissolving dyes in a thermoplastic co-condensate product derived from (i) melamine or a derivative thereof or its partial condensate with an aldehyde, (ii) an aliphatic or aralkyl sulphonamide, the SO_2NH_2 gp. being linked to the aromatic nucleus through an aliphatic chain, and where the mol. has 2 reactive amide H atoms, and (iii) HCHO or paraformaldehyde. Thus, benzyl sulphonamide-HCHO resin (180) is heated 10 min. at 130°C . to a clear solution with melamine (20). Paraformaldehyde (14.3) is added at 120°C . and after heating to 135°C . in 30 min. the clear liquid is cooled. It solidifies at 105°C . and at $< 100^\circ\text{C}$. becomes brittle, friable and easily ground to a fine powder. The condensates are superior to known sulphonamide-aldehyde resins and are very suitable for pigment compositions. The most suitable dyes are of the fluorescent naphthalimide or xanthene classes. A.T.P.

Carbon Black (C.I. Pigment Black 6 and 7) (I p. 691)
Continuously Heated Carbon Black Furnaces (I p. 691)
Acid Thiazole Monoazo Dyes. Dyeing and Metallisation on Wool, Nylon, and Terylene (VIII p. 704)
Dyeing and Printing Polyacrylonitrile (VIII p. 705)
Printing with Direct Black A (IX p. 706)
Printing with Azoic Compositions (IX p. 706)
Diazotype Process (IX p. 707)
Effect of Molecular Weight on Fluorescence of High Molecular Compounds (XIII p. 710)
Zone Electrophoresis of Anthocyanins (XIV p. 711)
Influence of Sulphonate Group Orientation on Light Fastness of Acid Wool Dyes (XIV p. 712)
The Use of Colour in Cosmetics (XV p. 712)

V—PAINTS; ENAMELS; INKS

Moisture-resistance of Cold-cured Epoxide Resin Paints. II—Influence of Solvent

D. M. James

J. Oil & Col. Chem. Assoc., 43 (Sept 1960) 653-673

Films from cold-cured epoxide resin paints laid from solvent mixtures containing an appreciable quantity of water-soluble solvent will blister on immersion in distilled water; the effect is accentuated by a slow rate of evaporation. Although films tend to contract on immersion in water, they expand on immersion in certain alcohols and their aq. soln., often without blistering. Blistering cannot therefore be ascribed to over-all expansion of the film; it is, however, associated with loss of adhesion. Water may cause differential expansion of the film across its thickness, and loss of adhesion; it may also cause an osmotic pressure owing to retention of water-soluble solvent. The effect of replacing water by aq. soln. of alcohols or salt, the evidence of internal pressure as a cause of blistering, and the presence of volatile oxidisable material in the blister fluid, all indicate osmotic pressure as a blistering force. These forces are opposed by the over-all contractile force and that of adhesion; on this balance may depend whether blistering occurs or not. Effects of water-soluble solvents are ascribed to the retention of ca. 1% (of film weight) of solvent, this being concentrated at or near the adhesion interface. Two solvent mixtures are proposed, for brushing and spraying, which allow the films to develop good water-resistance.

J.W.D.

Wetting, Film Formation and Other Problems in Water-based Industrial Stoving Paints

E. S. J. Fry and E. B. Bunker

J. Oil & Col. Chem. Assoc., 43 (Sept 1960) 640-652

A review of problems in the application of water-based

industrial stoving paints, with particular reference to the physical chemistry of wetting and film formation. The concept of critical surface tension is applied to the wetting of various surfaces by paints based on water-soluble resins. Electrical measurements on films immersed in NaCl soln. support the idea that certain latices, at least, give stoved films in which the water-soluble material is distributed as a continuous network rather than in discontinuous pockets.

J.W.D.

PATENTS

Tinting Compositions for Paints

Lewis Berger & Sons

BP 848,380 (24 Oct 1958)

The method of BP 762,439 (J.S.P.C., 73 (1957) 70) employs diacetone alcohol as the solvent but this is liable to decompose to acetone under alkaline conditions and to form mesityl oxide when on the acid side. Acetone causes smell and risk of fire while mesityl oxide dissolves some pigments and so causes loss in colour strength. These difficulties are overcome by replacing the diacetone alcohol by hexylene glycol or 3-methoxybutanol.

C.O.C.

Pigment Coatings and Dispersions

L. A. Sonstagen

BP 844,786 (8 Jan 1957)

Pigment dispersions are obtained by mixing a pigment, binder and a volatile solvent and applying a shearing force at a rate of shear of $< 2000 \text{ sec}^{-1}$, and then diluting with binder by evaporating some solvent and simultaneously adding more binder or diluting agent until there is enough binder to prevent re-agglomeration or re-aggregation of the pigment on further thinning. The process can be done in partial vacuum and is used to prepare pigment coating products, e.g. paints and enamels, where the binder is a resinous material, and printing inks where the binder is a drying oil.

BP 845,045 (31 Mar 1958)

The above process is modified by mixing the pigment and solvent before adding the binder so as to form a thin semi-paste offering little shear resistance. Binder is then added to dilute, with simultaneous or subsequent application of heat and/or vacuum and shearing force of $< 2000 \text{ sec}^{-1}$. The method is especially applicable where the pigment consists entirely or mainly of extremely small particles held together by strong or weak forces in clusters or aggregates and where the particles are so small that the voids and interstices between them are smaller than the diameter of a substantial proportion of the binder molecules.

A.T.P.

Thickening, Suspending and Emulsifying Agents for Water-base Paints and Coating Compositions

B. F. Goodrich Co.

BP 846,019 (U.S.A. 16 May 1956)

The above cpds. are mixtures of (A) an alkali metal or NH_4 salt of a partial ester and/or amide of an interpolymer of a H_2O and solvent insol. monomeric mixture of (i) an $\alpha\beta$ -olefinically unsatd. polycarboxylic anhydride (I)—



($\text{R}^1, \text{R}^2 = \text{H}, \text{Hal}, \text{CN}, \text{Alk}, \text{Aralk}, \text{Alkaryl}, \text{Ar}$, or cycloaliphatic), (ii) < 1 monolefinic monomer copolymerisable with I, and (iii) a cross-linking agent, polymerisable material containing $\text{CH}_2 = \text{C} =$ groups capable of imparting insolubility to the above salt without destroying its hydrophilic and swelling properties and (B) a water-soluble alkali or NH_4 salt of a polymer of an $\alpha\beta$ -olefinically unsatd. carboxylic acid or nitrile, and where the ratio of sol./insol. salt being 10:1 to 1:5 by wt. Thus A may be a mixture of an insoluble monovalent alkali salt of a partial diethylethanolamine ester of an interpolymer of maleic anhydride, methyl vinyl ether, and sufficient polyallyl polyether of sucrose for (iii), and B may be a maleic anhydride-vinyl acetate copolymer, aq. alkali treated. They are bacteriostatic and give greatly improved pigment suspension and stability, good levelling and brushability and improved sag and drip resistance.

A.T.P.

Plasticisers for Urea- and Melamine-Formaldehyde Resin Coating Compositions

Balm Paints Proprietary

BP 845,046 (Australia 1 Apr 1957)

Non-drying oil modified alkyd resins copolymerised with vinyl cpd. are improved plasticisers (I) for urea-HCHO and melamine-HCHO resins used in coating compositions (II). They are obtained from vinyl copolymers of mol. wt. 1500-3500 (e.g. allyl glycidyl ether-glycidyl methacrylate copolymer) containing 1-4% of epoxy groups, by esterification through the latter with -COOH groups of a non-drying oil fatty acid or of a partially condensed alkyd resin modified with a non-drying oil or with a non-drying oil fatty acid. A.T.P.

Stone-like Coatings

Springhill Products

BP 844,476 (31 Oct 1957)

A synthetic resinous composition is applied as a wet layer to the backing material after which a layer of aggregate, e.g. sand, is applied to the wet resinous layer. The resinous composition has sand dispersed in it and this forms a key for the layer of aggregate applied to it. Preferably the resinous layer contains a pigment and the aggregate is translucent so that the pigment shows through it. C.O.C.

Compatible Mixture of Polyvinyl Chloride and Polychlorobutadiene for Use as Coatings (III p. 692)
Coating Compositions and Textile Finishes (III p. 692)
Plasticisers and Polymers Derived from Fats (XIII p. 711)

VI—FIBRES; YARNS; FABRICS

Fundamentals of Fibre Research—A Physicist's Story

W. T. Astbury

J. Textile Inst., 51 (Aug 1960) p 515-F 526

A summary of some of the past, present, and possible future operations of physics in fibre science at the molecular structural level. M.T.

Some Aspects of Fibre Physics

R. Meredith *J. Textile Inst.*, 51 (Aug 1960) p 527-F 537

A paper mainly concerned with those aspects of fibre physics which describe and explain the properties and behaviour of fibres in relation to their physical environment, i.e. their reaction to stresses and strains, moisture and heat. Practical consequences of the properties revealed by physical measurements are described, and what such measurements reveal of the internal structure of the fibre is indicated. The properties discussed are: fibre dimensions and density, and optical, electrical, thermal and mechanical properties. M.T.

Entropy Stress Study of Various Textile Fibres

S. L. Dart *Text. Research J.*, 30 (May 1960) 372-380

Stress-strain study made of various fibres to determine their entropy force behaviour at room temperature has shown the relative importance of entropy and internal energy forces. Illustrations are given of the use of these quantities in understanding the fine structure of polymers. C.O.C.

Location of Xanthate Groups in Viscose

J. J. Willard and E. Pacsu

J. Amer. Chem. Soc., 82 (20 Aug 1960) 4350-4352

Xanthate benzyl ester (I) was prepared by action of benzyl bromide on commercial ripened viscose giving degree of substitution (DS) per anhydroglucose unit of 0.31. Complete methylation of (I) could not be achieved but (I) was readily benzoylated to give benzoyl DS 2.67. Dexanthenation was carried out as described in *J. Amer. Chem. Soc.*, 82, 4347 (1960) via the monothiolcarbonate to give a product of benzoyl DS 2.67. This product was readily methylated to methyl DS 0.33. The benzoyl blocking groups were removed to give a methyl cellulose which was hydrolysed to D-glucose and its O-methyl deriv. Chromatographic separation showed that the predominant monomethylglucose fraction contained 37% 6-O-methyl, 20% 3-O-methyl and 43% 2-O-methyl, thus indicating actual location of original xanthate group. (I) could not be benzoylated when prepared from green viscose. F.J.

New Method of Removing Xanthate Groups from Carbohydrates

J. J. Willard and E. Pacsu

J. Amer. Chem. Soc., 82 (20 Aug 1960) 4347-4350

Xanthate groups in carbohydrates have been located by a new method. Methyl α -D-glucopyranoside xanthate (I) in aq. barium hydroxide formed carbon-6-xanthate in 20% yield, isolated as the α -benzoyl ester. Action of mercuric acetate on the tribenzoate yields cryst. tribenzoyl monothiolcarbonate which could be oxidised to give the known methyl 2,3,4-O-tribenzoyl- α -D-glucopyranoside in good yield. No benzoyl migration occurred during dexanthenation. F.J.

Some Physical Properties of Chemically Finished Viscose Rayon Filament Yarns and Fabrics

D. H. Morton and C. Beaumont

J.S.D.C., 76 (Oct 1960) 578-583

Chemistry of Protein Fibres

J. B. Speakman

J. Textile Inst., 51 (Aug 1960) p 392-F 407

Research is described which has led to the present picture of the chain molecules of fibroin. These have mol. wt. of 84,000 and consist of alternate sections with average mol. wt. of 4000 and 3000, the former giving the crystalline regions and the latter the amorphous regions. The structure of wool keratin is more complicated; the skeleton structure, proposed about 25 years ago, has led to many advances. The study of setting of wool is discussed in detail. Complete amino-acid analyses of typical wools are given and attempts to determine the amino-acid sequence in wool are described. A new approach, based on differences in accessibility of the crystalline and amorphous regions of the fibre, is outlined. This and other methods should allow the constitution of the crystalline regions of keratin to be determined. 55 references. M.T.

Plasticity of Wool

P. de Wet, J. B. Speakman, and K. J. Whiteley

Nature, 188 (1 Oct 1960) 69

Work indicating that there is no simple relationship between the plasticity of wool and its urea-bisulphite solubility. C.O.C.

Reaction of Bromine Water with Wool Keratin

S. Blackburn

J. Textile Inst., 51 (July 1960) τ 297- τ 298

When wool is treated with bromine water at room temp., small amounts of peptide material pass into soln. A peptide precipitated by ethanol is almost identical in composition to γ -keratase. This peptide (designated Keratase III) is probably involved in the formation of Allwörden bubbles. Considerable amounts of peptide material are extracted from brominated wool by NaHCO_3 soln. Acidification of extract with $\text{CH}_3\text{CO}_2\text{H}$ precipitates a peptide (Keratase I) closely similar to α -keratase, except tyrosine is probably replaced by dibromotyrosine. It is not yet possible to say if, in addition to bromination of tyrosine residues, fission of peptide links involving its carboxyl groups occurs to a significant extent. Work is continuing. M.T.

X-ray Study of Sorption of Water by Silk Fibroin of *Bombyx Mori*

J. O. Warwicker

J. Textile Inst., 51 (July 1960) τ 280- τ 292

The X-ray diagram of fibroin from *Bombyx mori* is not affected by drying, so that in the sorption of water by fibroin intramolecular swelling does not take place. Intracrystalline absorption also seems to be absent. M.T.

Twenty-five Years of Man-made Fibres

H. W. Melville

J. Textile Inst., 51 (Aug 1960) p 382-F 391

Describes and contrasts the methods of discovery of nylon, Terylene, and acrylic fibres; discusses the relation between the properties of polyamides and their chemical structure; mentions synthesis of polypeptides, describes new methods of synthesis, i.e. interfacial polymerisation, preparation of isotactic polymers. M.T.

Dyeability and Physical Properties of Polyacrylonitrile Fibres

L. Rudolph

Chemiefasern, 10 (Sept 1960) 607-610

Three types of polyacrylonitrile fibres were tested for

processing properties and dyeability. All consisted of 100% polyacrylonitrile and were wet-spun. Type A received a thermal aftertreatment and showed ring formation in the cross-section and poor dyeability; type B was not aftertreated and showed better dyeing properties; type C, aftertreated with KOH, was the most easily dyed. Further experiments proved, however, that the better dyeability was offset by a lowering of the physical and processing properties. The conclusion is drawn that the problems involved must be solved by the use of copolymers. W.M.

Highly Polymeric Acrylic Derivatives

VIII—Pyrolysis of Vinyon N

J. Schurz, W. Skoda, and H. Bayzer

Mh. Chem., **91** (29 Apr 1960) 263-269

Vinyon N is damaged by heat at 160°C. The chlorine content rapidly decreases linearly with temp., whereas the nitrogen content remains unaltered, and the material becomes almost completely insoluble in dimethylformamide. Infrared measurements reveal the occurrence of new bonds, which are secondary amide links and conjugated double bonds. These phenomena are discussed.

X—Molecular Dimensions of Vinyon N

J. Schurz, G. Warnecke, and Th. Steiner

Mh. Chem., **91** (30 June 1960) 561-576

From optical dispersion data afforded by Vinyon D in dimethylformamide (DMF) a method is described for calculating the anisotropy of the particles. Viscosity measurements were made and expressed according to the coiled and ellipsoid models. From this information the convolutions of the fibre were determined; it appears that the Vinyon N molecule in DMF is a right compact coil with persistence length 27 Å and with negative specific anisotropy of the fundamental unit. H.H.H.

Sorption of Water Vapour and Heats of Wetting of Some Polyamides

E. F. Nekryach and Z. A. Samchenko

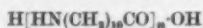
Kolloid. zhur., **22** (May-June 1960) 288-292

Adsorptive and hydrophilic properties of nylon 6 (I) and nylon 6.6 (II), both having an identical number of, but differently arranged, methylene groups per carbamide group, have been investigated. Adsorption isotherms of water vapour (20°C.) are found to be almost indistinguishable for I and II when changing p/p_s from zero to 0.85. Likewise, curves of heats of wetting as a function of the humidity content of the fibre ($f(x)$) show great similarity. A plot of differential heats of wetting (q_{diff}) against $f(x)$ has revealed two regions of const. q_{diff} corresponding to the heat of hydration of free carbamide groups and the heat evolved from other processes, respectively. For both fibres, the ratio of carbamide groups to bonded water molecules is 2:1. G.J.K.

Properties of Nylon 11

J. G. Hawkins *Plastics*, **25** (Aug 1960) 299-301

Rilsan, nylon 11 (Organico) is synthesised from castor oil and has the structure—



Details are given of its physical, chemical, electrical, and mechanical properties. It is more inert than other nylons but retains the inherent strength of the family. Rilsan is manufactured in ten grades, falling into four property-groups. J.W.D.

PATENTS

Pigmented Polyesters

N.V. Onderzoeksinstituut Research

BP 847,959 (Holland 19 Oct 1957)

Polyesters from the condensation of glycols $HO(CH_2)_nOH$ ($n = 1-10$) and terephthalic acid or its ester forming derivatives are coloured during manufacture by pigment dispersions, e.g. TiO_2 (C.I. Pigment White 6) and Carbon Black (C.I. Pigment Black 6 and 7), (prepared by ball-milling with water or terephthalic acid in presence of ionic dispersing agents) in the presence of 0.005-0.3 mol. % per mol. terephthalic acid of a metallic soap. The latter, e.g. Zn or Al distearate or Ca palmitate, facilitate homogeneous pigment distribution throughout the polyester. A.T.P.

Stable Dispersions of Pigments in Polyesters

ICI BP 847,959 (17 Oct 1958)

Stable dispersions of pigments are obtained in polyesters if they are milled together in presence of an aqueous liquid. C.O.C.

Polycaprolactam of Semi-dull or Dull Appearance

Allied Chemical Corp. USP 2,919,258 (17 Feb 1956)

Al and Cu adipates are excellent delustring agents for polycaprolactam. Other normal metallic salts of saturated aliphatic dicarboxylic acids of 2-10 C may also be used and the process is applicable to other polyamides. These delustring agents do not act as pigments but are compatible with molten unoriented polyamide and the delustring effect is only developed to the full when the polyamide is cooled and molecularly oriented, e.g. by stretching. C.O.C.

Acrylic Fibres for Blending with Natural Fibres

American Viscose Corp.

BP 843,116 (U.S.A. 30 Dec 1955)

A mixture of an acrylonitrile-vinyl acetate copolymer (< 90% acrylonitrile) and a copolymer of acrylonitrile and 2-methyl-5-vinylpyridine yields fibres which when blended with natural fibres yields a product that is readily dyed by normal union dyeing methods. The proportions of the components are such that the fibre contains 3-8% of 2-methyl-5-vinylpyridine. C.O.C.

Pigmented Particles of High-melting Polyesters

FH BP 844,286 (Germany 1 Feb 1956)

The polyester particles, e.g. chips for melt spinning, are treated with a dispersion containing a pigment, a volatile solvent inert to the polyester and as binder a film-forming polyester which is soluble in the solvent, has m.p. > 130°C. and which does not decompose at the m.p. of the polyester to be treated. Fibres produced from the treated polyester have a full, deep and permanent coloration. C.O.C.

Styryl Dyes for Mass Colouring of Synthetic Polymer Fibres (IV p. 698)

Changes in Fine Structure and Mechanical Properties induced by Cyanoethylation of Cotton Yarns. I—Treated without Tension (X p. 708)

Preparation and Rates of Hydrolysis of Perfluoroesters of Cellulose (X p. 708)

Reaction of Wool with Oxidants in Concentrated Salt Solutions (X p. 708)

Aspects of Rubber-Textile Adhesion (XIII p. 710)

Dry-colouring Polypropylene (XIII p. 711)

Infrared Spectroscopy of Fibre-forming Polymers (XIV p. 712)

VII—DESIZING; SCOURING; CARBONISING; BLEACHING

Sodium Metasilicate

G. S. Nastevich and F. Khachatryan

Tekstil. prom., **20**, No. 8 (Aug 1960) 82

Brief note in which the use of sodium metasilicate, instead of sodium silicate and soda, is advocated in bleaching and simultaneous bleaching and dyeing of cotton fabrics. G.J.K.

Bleaching Dark-coloured Raw Wool

N. I. Podgornaya and A. A. Grigor'eva

Tekstil. prom., **20**, No. 8 (Aug 1960) 60-61

Dark brown, naturally coloured mixed breed and rough wool is scoured and bleached using 30% H_2O_2 (30% on wt. of fibre), Na_2CO_3 (5%), Na_2SiO_3 (5%), at 70°C. for 1 hr. at a liquor ratio of 15:1 (10:1 if a liquor-circulating apparatus is used). A light beige product is obtained with fibre strength loss of 10-12%. G.J.K.

Dyeing and Finishing of Polyester-Wool Fibre Mixtures (VIII p. 705)

Determination of Alkali in Bleaching Baths Containing Hydrogen Peroxide (XIV p. 712)

Determination of Non-cotton Content of Bleached Cotton Textiles (XIV p. 712)

VIII—DYEING

Early Days of Dyeing

H. R. Bush

Dyer, 124 (12 Aug 1960) 231-234;
(23 Sept 1960) 450-460

Review, partly based on conjecture, of ancient dyeing methods, dyes, and the dyer's status. The Greeks described dyeing as wetting, dipping and fixing. An Egyptian papyrus gives precise working instructions for dyeing wood (used 2500 B.C.) on wool. In China, officials supervised preparation and dyeing of silk. Babylon dyed rich and varied colours on wool. In Palestine and Syria there were highly skilled commission dyers who monopolised the craft in the ancient world—their status was high. In Egypt, Rome and Sparta the dyer's standing was low; in Greece dyeing was carried out by women. The dyes used were: red—kermes, madder; blue—woad, indigo; yellow—safflower, saffron; purple—Tyrian purple and its many inferior imitations; green—by mixture, and black and brown by blending natural coloured wools. 9 references. R.A.P.

Recent Developments in Dyeing and Printing

B. C. M. Dorset

Text. Manuf., 86 (Sept 1960) 367-371, 375

A review of recent improvements in levelling agents, reducing agents, methods of dyeing polyamide and polyester textiles, pressure-dyeing techniques for synthetic fibres, and padding methods. M.T.

Dye Migration in Pad-dyeing with Vat Dyes

M. Bräuer

Melliand Textilber., 41 (Sept 1960) 1102-1109

There is less migration on padding linen and viscose rayon than on padding cotton; mercerising reduces the extent of migration on cotton. Pre-treatment with Al sulphate suppresses migration but this process is of no practical interest. Treatment with wetting agents before padding reduces migration by improving absorbency and thereby decreasing surface water. Degree of migration depends on the amount of padding liquor taken up. With an expression of 50% no more migration occurs. Migration is also a function of the temperature gradient between the padded piece and the surrounding air. Migration is promoted by higher amounts of dispersing agents in the dye and is reduced by addition of electrolytes and thickeners to the padding liquor. W.M.

Determination of Rate of Absorption of Vat Dyes

E. S. Nekrasova and S. G. Abramovich

Tekstil. prom., 20, No. 7 (July 1960) 49-52

Experiments have been carried out to determine rate of absorption of vat dyes on cotton yarn (mercerised and unmercerised) from a standard bath. The amount absorbed was determined colorimetrically. The dyeings were carried out in both normal and nitrogen atmospheres. The rate of absorption was considerably higher in an atmosphere of nitrogen, especially with indigoid and indanthrene derivatives. Polycycloketone derivatives are absorbed more readily and more completely than indigoids. Introduction of halogen (Br) into the molecule of the dye Vat Golden Yellow KKh increased the percentage absorption from 53 to 82%. The effect of a retarding agent on the rate of absorption was also investigated. L.S.L.

Copper Aftertreatment of Spun Viscose-Wool Mixtures

B. Mihalek

Chemiefasern, 10 (Aug 1960) 511-514

The fabric was dyed with a copperable dye (Halbwoll Kuprophol Marine Blau 2RL) and aftertreated with copper sulphate and acetic acid. The aftertreatment was carried out at different temperatures and it was found that the amount and rate of copper uptake increases with temperature and that an aftertreatment at 100°C. yields the best fastness properties including fastness to rubbing. The latter (unexpected) fact is explained by the assumption that the treatment at 100°C. removes any loose surface dye. W.M.

Theoretical Considerations of the Dyeing of Cellulose Acetate with Disperse Dyes

H. J. White *Text. Research J.*, 30 (May 1960) 329-338

Of two models for the dyeing process, one based on mixing of polymer segments with absorbed molecules and the other on absorption on to sites within the fibre, only

the second model was qualitatively consistent with most of the experimental results. Hydrogen bonding seems to be important, but this is not the only possible mode of attachment between dye and fibre. The rigid flat structure of the dye molecules enables them to fit closely to appropriate solid surfaces with minimum loss of entropy and maximum amount of bonding by dispersion forces and by dipole interaction. C.O.C.

Improvements in the Colouring of Triacetate Fibre Goods

J. A. Somers

Text. Rec., 78 (Oct 1960) 57-61

A review of recent modifications in methods of dyeing cellulose triacetate textiles. It deals primarily with the use of dye-carriers and fibre-swelling agents, methods used in the U.S.A., and modification of dyes. M.T.

Acid Thiazole Monoazo Dyes. Dyeing and Metallisation on Wool, Nylon, and Terylene

L. Pentimalli

Chim. e ind. (Milan), 42 (1960) 26-29*Chem. Abs.*, 54 (25 July 1960) 14692

2-Aminothiazole, 2-aminobenzothiazole, 2-amino- α -naphthothiazole and 2-amino- β -naphthothiazole were diazotised and coupled with Schaeffer, H, and Chicago acids. The resulting dyes were applied to wool from a bath containing Glauber's salt and diammonium phosphate, followed by exhausting with sulphuric or acetic acid. They were also applied to Terylene at 100°C. in presence of *o*-phenylphenol. The dyeings had a brightness and fastness, including some blues and greens, quite unusual with monoazo dyes. The fastness to light was improved by coppering, which had no effect on the hue of dyeings on wool, but changed the hue of the dyeings on Terylene. C.O.C.

Dyeing of Difficultly Dyeable Fibres

XIV—Fixing Basic and Condensation Dyes with Phosphomolybdic or Phosphotungstic Acid

K. Yamada and C. Shinomiya

J. Soc. Textile Cellulose Ind. Japan,

16 (Aug 1960) 653-656

The ratios of absorption of molybdenum (Mo) and tungsten (W) on vinyon, nylon 6 and wool are temperature-dependent, but the maximum absorption is independent of temperature. If the gram-atom total of Mo and phosphorus (P) is constant, maximum absorption of Mo on vinyon is obtained at a ratio Mo:P = 3:1. If [Mo] is constant, absorption of Mo and P by vinyon and nylon 6 increases with [P], the maximum absorption concentration indicating that the molecular structure of the complex acid is $3H_2O \cdot P_2O_5 \cdot 24MoO_3$. M.T.

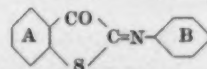
XV—Dyes Formed by Condensation of Thioindoxylcarboxylic Acids and Aromatic Nitroso Compounds

K. Yamada

J. Soc. Textile Cellulose Ind. Japan,

16 (Aug 1960) 656-661

Thioindoxyl carboxylic acids condensed with, e.g. *p*-nitrosodimethylaniline, 6-nitroso-3-dimethylamino-phenol, 4-nitroso-*NN*-dimethyl- α -naphthylamine, gave 2-arylamino-3-(2H)-thionaphthenones—



(A, B may contain further substituents, B may be naphthalene), which dyed synthetic fibres in deep shades. Fastness was good on Saran, but on Perlon, nylon-6, Terylene, and polyacrylonitrile poor fastness obviated any practical interest. A.T.P.

The "Irga-Solvent" Process. A new Method for Dyeing Polyamide Fabric

C. Hobday and G. Siegrist

Melliand Textilber., 41 (Sept 1960) 1119-1121

Advantages and disadvantages of the use of disperse and acid wool dyes for dyeing nylon fabrics are surveyed. By adding a solvent (benzyl alcohol) and an anionic auxiliary agent (Tinegal BAN) to the dyebath, level dyeings and good exhaustion can be obtained with acid dyes. The wet-fastness of these dyeings is superior to that of dyeings produced with disperse dyes and can be further improved by an aftertreatment with tannin and potassium antimonyl tartrate (tartar emetic). Recipes and a list of suitable dyes are given. W.M.

Dyeing Capron with Azole Dyes

P. V. Morfganov and B. N. Mel'nikov

Tekstil prom., 20, No. 6 (June 1960) 40-42
Detailed method of application, together with a list of suitable combinations of naphthols and bases, is given.
L.S.L.

Dyeing of Synthetic Fibres. IX—Dyeing of Capron with Metal-containing Acid Dyes

A. A. Kharkharov and E. E. Starikov

Tekhnol. tekstil. prom., No. 3 (16) (1960) 106-112
Three 1:2 chromium-containing acid dyes have been successfully applied to capron fabric, giving level dyeings for relatively high dye content. (2%). Fastness properties in general are very good, and some protection is given to the fibre by these dyes. The formulae of two dyes are given.
G.J.K.

Dyeing Polyamide Fibres with Metal-complex Dyes

J. Gadenne

Teinture et Apprêts, 59 (Aug 1960) 116-123
Metal-complex dyes containing one metal atom per two mol. dye may contain water solubilising (I) or insolubilising (II) groups in the benzene nuclei. They are anionic complexes, capable both of reacting with the basic groups of polyamide fibres and of being adsorbed by a solution process. The latter is predominant when the metal-complex dye is of hydrophobic character and such dyes have a much higher saturation value than dyes containing (I), are capable of covering up fibre irregularities, and have excellent fastness to light and wet treatments. Application is governed by particle size, dyebath stability, and auxiliary agents necessary for migration into the fibre. They may be used in admixture with selected acid dyes; detailed recipes are given for their application by printing, thermofixing, dyeing at 100°C. and 120°C. and for a black on wool-nylon mixtures. Whilst having some affinity for animal fibres, they reserve cellulosic fibres, and secondary and tri-acetate, thus making them suitable for reserve and two-tone effects on mixtures with polyamides.
A.T.P.

Remarks on the Dyeing of Polyamide Fibres

R. Weber

Chemiefasern, 10 (Sept 1960) 591-594
Classes of dye suitable for polyamide fibres are listed and the properties of dyeings produced with the various classes are shown in a table. Disperse, acid wool, and 1:2 metal-complex dyes are mostly used. The blocking effect and its dependence on the number of sulphonic acid groups is explained. Dyeing with 1:2 metal-complex dyes is discussed in some detail and an example of a dyeing recipe together with an aftertreatment with tannin and tartar emetic is given; it is pointed out that the value of this aftertreatment is very limited.
W.M.

Dyeing Terylene on a Laboratory High-temperature Beam-dyeing Machine

D. A. Garrett, I. E. Haden, and F. R. Smith

Dyer, 124 (9 Sept 1960) 405-413
The machine is described and the processing of Terylene-containing fabrics is discussed. All 100% Terylene fabrics are heat set to prevent shrinkage on the beam and several layers of cotton fabric are placed between beam and batch and on the outside of the batch. The edges of the outside wrapper are clipped to the beam. Overlap of fabric over the perforations in the beam is somewhat critical. The length of cloth which may be dyed satisfactorily is governed by the number of layers (N), the porosity of the fabric (P = air porosity in c.c./sec./sq.cm./cm.) and the power of the pump. The ratio N/P is a guide to the capacity of the beam; level dyeings were obtained (in 2 hr.) if N/P did not exceed 50. Since the pressure drop across the beam is similar (16-18 lb./sq.in.) for different machines, the safe value of N/P should be fairly constant for many machines though it may be less for shorter dyeing times. In general, the best results are obtained with liquor circulating "in to out" for the first 10-15 min. and "out to in" for the remainder of the dyeing time for woven fabrics, and "in to out" the whole time for warp-knitted fabrics. Coverage of filament fabrics was very satisfactory, but water-marking of warp-knitted fabrics was not eliminated completely, even at low tensions and with extra cotton wrapping. Terylene-wool and Terylene-cotton fabrics were dyed successfully,

but loads were reduced with Terylene-cotton because of the swelling of the cotton.
W.P.M.

Dyeing and Finishing of Polyester-Wool Fibre Mixtures

W. Brennecke and E. Ernst

Chemiefasern, 10 (Sept 1960) 596-602
Inspection of grey cloth and removal of oil stains are considered first. For washing, open-width machines are preferred and non-ionic detergents are recommended. Crabbing procedure and the precautions necessary in the case of coloured woven pieces are described. Drying and heat-setting of polyester-wool fibre mixtures are then discussed. Steaming is considered useful for removal of residual stresses in the pieces. The importance of shearing and/or singeing to prevent pilling is explained. Finally finishing (pressing and decatizing) are dealt with.
W.M.

X-ray Study of the Reaction between Polyvinyl Alcohol and Congo Red (C.I. Direct Red 28)

N. Okada and I. Sakurada

Kobunshi Kagaku, 18 (1958) 671-676
Chem. Abs., 54 (25 July 1960) 14761
Gelation of the polymer occurs in 1-5% aqueous Congo Red while in a 3% solution syneresis occurs. At higher concentrations the X-ray diagram of the polymer is remarkably different from that of the original sample. Similar results are obtained by immersing films or filaments of the polymer in Congo Red solutions of various strengths. The films and filaments become plastic and can be drawn to several times their original length. X-ray diagrams of these drawn filaments show three new interferences on the meridian. The spacings are 13.20, 8.80 and 6.54 Å. The fibre period calculated from the above spacings is 26.4 Å. As such interferences either occur neither with the pure polymer nor with the dye, they may belong to a polyvinyl alcohol-Congo Red complex.
C.O.C.

PATENTS

Dyeings and Prints on Cellulose Triacetate

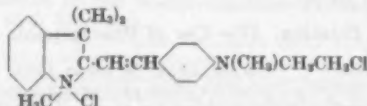
BASF

BP 844,784 (Germany 26 June 1956)
Very good fastness is obtained by use of *p*-aminoazo dyes free from sulphonic and carboxylic groups and in which at least one H atom of the terminal amino group is replaced by an -Alk-O-CO-R group (Alk = satd. alkylene of < 7 C; R = H or aliphatic radical of < 7 C). Thus a deep red of very good fastness to light and good fastness to washing is obtained by dyeing with 1-amino-2-methoxy-4-nitrobenzene → *N*-ethyl-*N*-(2-acetoxy)-ethylaminobenzene in a boiling 4% soap bath.
C.O.C.

Dyeing Acrylic Fibres with Cationic Dyes

FBY

BP 844,822 (Germany 14 Aug 1957)
Polyacrylonitrile, polyvinylidene cyanide or copolymers thereof with other vinyl compounds are readily dyed level with cationic dyes in baths containing a quaternary ammonium compound containing an alkyl radical of > 7 C and a benzyl radical which may be substituted by Hal. Thus polyacrylonitrile yarn is entered into a bath at 50°C. containing the cationic dye (0.05 g./l.)—

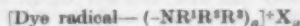


dimethylacetammonium chloride (0.2), Na acetate (0.25), and glacial acetic acid (0.2), liquor ratio 40:1. The bath is slowly raised to 96°C. and dyeing continues at this temperature for 1 hr. This yields a pale pink dyeing of excellent levelness.
C.O.C.

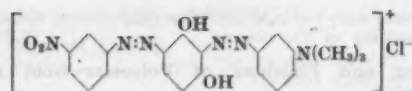
Dyeing and Printing Polyacrylonitrile

FH

BP 846,562 (Germany 6 Oct 1955)
Dyes of formula—



(R^1 , R^2 , and R^3 = Alk, cycloalk, aralkyl or Ar and/or two of them together with the N atom are the residue of a heterocyclic ring system; X = anion; n = whole number), e.g. the yellow—



have good affinity for polyacrylonitrile even at $< 100^\circ\text{C}$.
C.O.C.

Colouring Glass Fibre Fabric

General Aniline USP 2,919,172 (20 Nov 1952)

The fabric is first treated with aqueous caustic at pH 9–13 and then with an organic or inorganic compound containing an acid radical. Thus glass fabric was immersed for 1 hr. at 75°C . in an aqueous solution containing NaOH (7.2 parts) and Na phosphate (2) at pH 11.1. It was then rinsed in running water for several minutes and then dyed in an aqueous solution (3000) of Benzo Fast Scarlet GS (C.I. Direct Red 4) for 1 hr. at $90\text{--}95^\circ\text{C}$. This gave an even deep scarlet dyeing of good fastness to dry cleaning, substantial fastness to washing and no appreciable rubbing.
C.O.C.

Dyeing Glass Fibres

J. P. Stevens & Co. USP 2,919,173 (20 May 1958)

An aminoalkyl trialkoxysilane (Alk of 2–5 C, alkoxy each of 1–3 C) is treated with an aromatic carboxylic acid. Glass fibres are then treated with the resulting amide so that the alkoxy groups combine with the glass to form a siloxy bond between them. The treated fibres readily dye particularly with diazonium salts of formula $[\text{RN} \equiv \text{N}]^+ \text{M}^-$ (M = negatively charged radical; R = aromatic group or nucleus). Thus glass-fibre cloth was padded with an aqueous dispersion of the amide obtained from α -amino-propyl triethoxysilane and p -aminobenzoic acid, dried, padded in a diazotising bath and then with an alcoholic soln. of β -naphthol. This yielded a deep reddish orange dyeing fast to light and washing.
C.O.C.

COPE—A Card-operated Process-timing Equipment
Primarily Intended for the Control of Dyebaths
(I p. 691)

New Black Dyes for Cellulosic Fibres (IV p. 695)

Correlation between Colour-fastness and Structure of Anthraquinone Blue Disperse Dyes (IV p. 695)

Styryl Dyes for Mass Colouring of Synthetic Polymer Fibres (IV p. 698)

Dyeability and Physical Properties of Polyacrylonitrile Fibres (VI p. 702)

Sodium Metasilicate (VII p. 703)

White and Coloured Discharge Prints on Fabrics Dyed with Direct Turquoise Blue Dye (IX this page)

Measurement by the Opal-glass Method of Absorption Spectra of Dye Adsorbed on Fabrics (XIV p. 711)

IX—PRINTING

History of Textile Printing in France

J. Palluy *Teinture et Apprêts*, 59 (Aug 1960) 124–127
A general historical review of the development of printing techniques in France and of early references to coloured fabrics.
A.T.P.

Screen Printing. IV—Use of Photographic Reproduction

A. Franken *Chemiefasern*, 10 (Sept 1960) 604–607

The different purposes for which photographic techniques can be used in screen-making are reviewed. Methods for building up a full size transparency from tracings of a single repeat are explained and a description of the necessary apparatus is given.
W.M.

Rongalit C, Rongal A and Hydrosulphite in Printing with Vat Dyes

W. Küppers *Tex*, 19 (July 1960) 428–434

All modifications of the two-phase printing process give brighter colours and better fixation than the Rongalit C-potash method. The most brilliant colours are obtained with the "rapid developing" method, which uses easily decomposed reducing agents, e.g. Rongal A or hydrosulphite, both methods having a very low energy consumption per running metre of material. The advantage of using Rongal A is that no H_2O_2 or acid is needed.
R.A.

Printing with Direct Black A

F. Katsishak

Tekstil. prom., 20, No. 6 (June 1960) 72–74
A derivative of diphenylamine, mainly the sodium salt of diphenylamine sulphamic acid—



can be successfully applied to various textiles to produce deep blacks, via air-oxidation in an acidic medium. Good results were obtained by padding and printing cellulosic fabrics. The dye can also be applied to silk, wool, and polyamide fabrics by printing techniques. Details of various printing recipes are given. This dye is claimed to have an excellent all-round fastness. It is sold in form of light grey crystals and contains 96–97% of active ingredient.
L.S.L.

White and Coloured Discharge Prints on Fabrics Dyed with Direct Turquoise Blue Dye

V. E. Rostovtsev

Tekstil. prom., 20, No. 6 (June 1960) 38–40

Cotton fabric dyed with a Direct Turquoise Blue (sulphonated copper phthalocyanine) can be discharge-printed to give white or coloured effects. The composition of the printing paste is—

	g./kg.
Mixture of Rongalit and thickener (1:1)	200
Mixture of potash and thickener (1:1)	150
Paste of Leucotrope V	100
(sulphonated dimethylbenzylammonium chloride)	
Starch thickener	400
Water	150

For white discharges the quantity of Rongalit mixture is increased from 200 to 300 g. of 1:1 mixture. Illuminated effects were obtained by the use of suitable vat dyes. Leucotrope V can be omitted from the recipes for colour discharges.
L.S.L.

PATENTS

Printing of Crease-shedding Fabric

Linen Industry Research Association

BP 842,790 (28 Mar 1959)

Fabrics of natural or regenerated cellulose alone which have been treated with resin to impart a crease-shedding finish or their mixtures with synthetic polymer fibres when printed with vat, azoic or other suitable dyes, yield prints whose fastness to light and washing is at least as good as those of similar fabrics printed before the resin treatment. The fabric may have been dyed before the resin treatment. This method results in no distortion of the printed pattern and better penetration of the colorant through the fabric. Thus bleached and caustic soda-shrunk dress linen which had been given a crease-shedding finish with urea-formaldehyde resin was screen printed with C.I. Vat Green 1 using British Gum as the thickener and Na sulphoxylate formaldehyde (C.I. Reducing Agent 3) as the reducing agent. The penetration of the print was superior to that obtained on a similar fabric not containing resin. The crease shedding property was unaffected.
C.O.C.

Printing with Azoic Compositions

FBY BP 843,241 (4 May 1957)

Diazoamino compounds from diazotised aminoazo compounds free from SO_2H and COOH groups (especially α -alkoxyaminoazobenzene) are applied to textile fibres with the usual azoic coupling components using a 2-alkyl-amino-4- or 5-sulphobenzoic acid as stabiliser, and developed by damping and neutral steaming to yield prints of excellent fastness to light, washing, and boiling. Pastes containing these have good keeping quality and show no visible loss in colour value when printed with vat or oxidation dyes. Thus, a neutral black of excellent fastness to light and washing is obtained with a paste based on 4-amino-2,5-dimethoxybenzene-1,1'-azo-2'-chloro-4'-nitrobenzene, 2-ethylamino-5(or 4)-sulphobenzoic acid and 2,3-hydroxynaphthylaminobenzene.
A.T.P.

Coating Polyester Film with a Light-sensitive Diazonium Compound

Ozalid Co. BP 849,820 (1 Oct 1956)

An acrylonitrile-methacrylic acid copolymer is a good binding agent when applying light-sensitive diazonium compounds to polyester film.
C.O.C.

Diazotype Process

Ilford

BP 848,458 (23 Nov 1956)

The diazo components described in BP 759,045 (J.S.D.C., 73 (1957) 33) yield dense images under alkaline conditions with coupling components of formula—



(R = H, Alk, Ar or aralkyl), e.g. 1,3,4-cyclopentatriene.

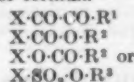
C.O.C.

Removing Uncoupled Colour Coupler from Photographic Emulsions

Kodak

BP 843,940 (U.S.A. 27 Sept 1955)

Colour couplers of formula—



(R¹ = subst. or unsubst. benzene; R² = Alk of 12–18 C; R³ = dodecyl, X = radical having coupling ability and is of mol. wt. > 300) are readily removed by treatment with H₂O₂ after exposure and development. C.O.C.

Preventing Yellowing of Diazotype Prints

Ozalid Co.

BP 849,739 (13 June 1957)

Addition to diazotype compositions, especially in two-component compositions containing naphthol derivatives as coupling components, of a monosaccharide, oligosaccharides (i.e. compounds containing 2–6 sugar units per mol.) and polysaccharides, e.g. dextrin, and a heavy metal salt, e.g. NiSO₄, results in very pure whites which do not tend to yellow on exposure to daylight. C.O.C.

Light-sensitive Polymers for Photomechanical Printing Processes

Kodak

BP 843,541–3 (U.S.A. 29 July 1955)

Contact Transfer for Xerography

Haloid Co.

BP 843,502 (27 Dec 1956)

Heat Transfers

Dennison Manufacturing Co.

BP 844,382 (U.S.A. 9 Jan 1956)

A wax release coating which can be applied to inexpensive paper backing, is receptive of high quality printing, resists strike through or migration of the ink, has low staining properties, resists picking during printing and has no offset tendency during storage comprises a Fischer-Tropach wax and/or an oxidised hard, high-melting aliphatic hydrocarbon wax. Both waxes have m.p. 50–110°C. and penetrometer hardness < 15 measured with 100 g. for 5 sec. at 25°C.

BP 844,437 (U.S.A. 9 Jan 1956)

The transfer layer consists of a mixture of a crystalline wax and a synthetic, thermoplastic, film-forming resin. C.O.C.

2-Azo-1-naphthol Colour Couplers (IV p. 696)

Recent Developments in Dyeing and Printing (VIII p. 704)

Dyeings and Prints on Cellulose Triacetate (VIII p. 705)

X—SIZING AND FINISHING**Antistatic Finish and its Problems**

H. Frotscher

Melliand Textilber., 41 (Sept 1960) 1121–1124

The effect of most antistatic agents is due to an increased surface conductivity of the fibre. In order to be permanent, an antistatic finish must be water-insoluble and resistant to mechanical treatment, especially abrasion in the wet state. To test whether a finish is permanent, methods for measuring the antistatic effect are needed. Two such methods are discussed, viz. measuring the surface conductivity and determining the time necessary for a given static charge to fall to half its value. Examples of actual measurements are given and their evaluation is explained. Finally the "side-effects" of anti-static finishes (reduction of tendency for pilling and soiling) are considered. W.M.

Biological Perspectives in Textile Research

R. G. H. Sui

J. Textile Inst., 51 (Aug 1960) P 439–P 449

Describes trends in biological research over last 50 years. Efforts were first directed to selection and breeding

of new varieties of animals and plants. This was followed by attempts to preserve raw and finished goods against attack by biological agents. Microbial degradation of wool and of cellulose, and the mildew-proofing of cellulosic textiles, are discussed in detail. More recent research is concerned with the actual requirements of the human user for his own comfort and functional efficiency. The possible development of fabrics which function as auxiliary biological organs is envisaged. Selected bibliography (39 references). M.T.

Resistance of Metallised Textiles to Light and Heat

E. Elöd and H. Jörder

Z. Ges. Textil-Ind., 62 (4) (1960) 103–108

Chem. Abs., 54 (25 July 1960) 14698

Two sets of samples were used—(a) To simulate clothing, the cloth was stretched on the upper part of an iron plate of 100 mm. diameter and 15 mm. high, well insulated on the bottom and sides with glass wool and asbestos, and having a thermometer well inside the metal. (b) To simulate awnings, parasols, etc., the cloth was stretched over an open cylinder of 135 mm. diameter and 125 mm. high, also well insulated and having a thermometer (with a black-lacquered tip) in its interior. Three radiation sources were used—(1) Philips' infrared globe radiation of 250 w. with a maximum radiation at 1.3 μ. (about 2000°C.); (2) Heraeus-Rotosil infrared radiator with a maximum at 2.3 μ. (about 1100°C.); and (3) Osram-Xenon high-pressure lamp XB0162, with a maximum radiation at 0.9 μ. and consequent lower temperature. The spectrum of the last-named corresponds closely to that of daylight. The cloth used was cotton, 100 g./sq.m., and the tests were done at 20°C. and 65% R.H. The following are the equilibrium temperatures (°C.) after 6 hr. with the indicated treatment and radiator used in the order a1, b1, a2, b2, a3, b3. Blue dyed: 101, 74, 117, 90, 39, 35. Undyed: 86, 75, 101, 95, 34, 34. Bleached: 77, 65, 95, 86, 31, 32. Treated with Al bronze lacquer (similar to Milium), 76, 55, 76, 70, 30, 31. Treated first with a synthetic resin dispersion and then with Al vapour *in vacuo*, 59, 51, 63, 68, 29, 31. Covered with Hostaphan (polyterephthalic acid ester) foil coated with Al deposited from vapour, 50, 44, 58, 55, 28, 30. Covered with Al foil (with binder), 37, 38, 41, 54, 26, 29. Al foil 0.0009–0.010 mm. thick, when perforated with 1000 holes of diameter 0.2 mm. per 100 sq. cm., was rendered permeable to air and water without its resistance to heat being affected. C.O.C.

Oil-repellent Finish with Fluorine Compounds

H. Enders and H. K. Wiest

Melliand Textilber., 41 (Sept 1960) 1135–1144

The principles of water repellency are discussed in some detail and it is pointed out that very similar considerations apply to oil repellency. It is then explained why highly fluorinated organic compounds should be suitable. The preparation of such compounds and the methods of application to textiles are described. A test for oil repellency is suggested. Soiling experiments were carried out with treated and untreated textiles. Although treatment with fluorine compounds cannot prevent soiling it greatly facilitates removal of stains. W.M.

Investigations of the Water-repellent Finishing of Textiles with Silicones

O. Venz Melliand Textilber., 41 (Sept 1960) 1125–1129

Two types of silicon compounds, the dimethyl and the hydrogen methyl polysiloxanes, and their behaviour are described. Formation of a film of polysiloxane on the fibre does not in itself impart water repellency; this film must be oriented so that the methyl groups point outwards. Orientation can be obtained by the simultaneous use of zirconium salts. The effect of the different types of dispersing agents used to emulsify the silicon compounds on exhaustion properties is described and an explanation is suggested. W.M.

New Developments in Textile Finishes with Special Reference to the "Wash-and-Wear" Finish

H. Enders

Tintoria, 57 (Aug 1960) 329–334

Epoxy resins are superior to others in respect of chlorine retention but give poor crease recovery. Combination of triazone-ethylene-urea and epoxy resins yields satisfactory results in both respects. Special catalysts are required for epoxy resins. Zinc nitrate and zinc fluoroborate are suitable. High concentrations of zinc

fluoroborate irritate the skin, but the concentration used in the finishing liquor has no such effect. Efforts to obtain good crease recovery and "wash-and-wear" effect while keeping the loss of tensile strength to a minimum were only partly successful. This loss is related to the change of elastic properties. The elastic extensibility increases and this leads to better crease recovery. But as incorporation of resin always reduces the total extensibility the result is a lowering of the plastic extensibility and therefore loss of tensile strength, which seems to be unavoidable. The different effect resin finish has on the tensile strength of cotton and spun viscose is discussed in some detail and several hypotheses to explain it are reviewed.

W.M.

Changes in Fine Structure and Mechanical Properties induced by Cyanoethylation of Cotton Yarns. I—Treated without Tension

C. M. Conrad, D. J. Stanonis, P. Harbrink, and J. J. Creely

Text. Research J., 30 (May 1960) 339-348

Cotton yarns impregnated with 6% NaOH and treated while relaxed with acrylonitrile at 60°C. for up to 60 min. gave products with degrees of substitution (DS) up to 2.6 cyanoethyl groups per anhydroglucose unit. As substitution increased, the X-ray diffraction pattern altered only slightly until DS > 1.1, after which the crystalline structure rapidly gave way to an amorphous structure, complete at about DS 2.0. Simultaneously density decreased nearly linearly with substitution. When the product became essentially amorphous it could be annealed at about 175°C. into a new pattern characteristic of cyanoethylcellulose. Annealing was accompanied by substantial increase in density. Stress relaxation of the treated yarns at DS 1.1 suggests a glass-rubber transition point about 140°C. which became distinct and moved to lower temperatures as DS increased. At DS ca. 2.0 stress relaxation reached a minimum (ca. 4% of that at 20°C.) at the highest temperatures used (220°C.). Further substitution caused a minimum relaxation at an intermediate temperature to be followed by increasing stress as the temperature rose. That effect was associated with crystallization. Breaking strength increased slightly at low DS but decreased to < 50% for the highest DS. Elongation at break increased gradually, being > 100% above the control at DS 2.0 and above. Tensile stiffness decreased to about 3% of its initial value. Work of rupture and recovery decreased considerably at DS < 2.0, but rose sharply between 2.0 and 2.6. Immediate elastic recovery was little affected at DS < 2.0 but rose above it. Delayed elastic recovery improved continuously as DS increased and eventually exceeded that of the control by nearly 50%.

C.O.C.

Rotproofing of Cotton with Pentachlorophenol and Lauryl Pentachlorophenol

H. J. Hueck and J. La Brijn

Textil-Rund., 15 (Sept 1960) 467-472

The concentration range of 0.5-2.0% gives good results, improved by the addition of a water-proofing agent to PCP. Fixing with a copper salt also improves the latter. Boiling-out with alkali before rot-proofing appears to be necessary.

S.R.C.

Preparation and Rates of Hydrolysis of Perfluoroesters of Cellulose

R. R. Benerito, R. J. Berni, and T. F. Fagley

Text. Research J., 30 (May 1960) 393-399

Cellulose treated with perfluorobutyl or perfluorooctanoyl chloride in dimethylformamide in presence of a tertiary aromatic amine yielded partial esters of cellulose of 0.02-0.58 degree of substitution. Use of essentially homogeneous solutions resulted in products which retained the properties of the original cotton but were in addition oil- and water-repellent. This repellency was durable to dry cleanings and aqueous laundering with neutral detergents.

C.O.C.

Resin Finishing of Cellulosic Fibres. V—Conditions of Curing

M. Yajima and K. Arakawa

J. Soc. Textile Cellulose Ind. Japan, 16 (Aug 1960) 668-672

Viscose rayon fibres were treated with melamine-formaldehyde resin. The temperature and duration of curing had considerable effect on tensile recovery, but little effect on tensile strength, elongation, knot strength,

bending rigidity and water imbibition. Steam-curing gave higher tensile recovery and bending rigidity, and lower water imbibition and knot strength, than did dry-curing.

M.T.

General Aspects of Mothproofing

H. J. Hueck

Tex., 19 (July 1960) 422-427

The qualitative and quantitative aspects of "moth-proofness" are examined. Wool can be damaged by various types of insects which differ in their sensitiveness to moth-proofing treatments. No moth-proofing agent can entirely prevent damage by moths and no material or fibre, except possibly thick Saran fibres and glass fibres, is completely safe from attack by moths. Lining materials may, therefore, be eaten even if the wool garment is not. A moth-proofing agent should be evaluated by its permanence as well as by its immediate effectiveness. The need for a more specific definition of "moth-proof" is stressed.

R.A.

Reaction of Wool with Oxidants in Concentrated Salt Solutions

J. R. McPhee

Text. Research J., 30 (May 1960) 349-357

Concentrated salt solutions protect wool from oxidative degradation. Oxidants produce greater shrink-resistance in conc. salt solutions than in absence of salts. Many oxidations, followed by reduction, reduce the felting power of wool when either treatment alone does not. Experiments confirm that attack on disulphide bonds is the only primary reaction during chemical treatment for reducing felting power and that attack at some other point of the protein structure is unnecessary. However, breaking of disulphide bonds alone is insufficient to produce shrink-resisting effects and the exact nature of chemical changes leading to shrink resistance is unknown. No conclusive evidence is known as to whether or not changes in frictional properties are the general cause of shrink-proofing. Under conditions where swelling is less than in simple aqueous solutions, reaction still occurs throughout wool fibres rather than only at the surface. The results obtained disagree with theories which suggest shrink-resistance is caused in some way by formation of degraded layers of protein in wool fibres. 56 references.

C.O.C.

PATENTS

Grafting Polymers on to Cellulose

DuP

BP 845,690 (U.S.A. 8 July 1957)

Cellulose is treated with a water-soluble non-polymerisable swelling agent and while swollen is subjected to ionising radiation while in contact with an ethylenically unsaturated monomer.

C.O.C.

Rot- and Insect-proofing of Cellulose

Monsanto Chemical Co.

BP 843,839 (U.S.A. 6 Sept 1956)

Treatment with an aqueous solution containing (a) a water-soluble salt of a polychlorophenol, (b) a tetra-alkali metal pyrophosphate, and (c) a salt of metal of a.g. > 4, e.g. sodium pentachlorophenate, tetrasodium pyrophosphate and CuSO₄. The finish is resistant to leaching.

C.O.C.

Minimising Residual Shrinkage

Redman Process International

BP 846,124 (10 Dec 1956)

The fabric is continuously led in open width through a steam chamber and is simultaneously given a wave-like or undulating flexing motion in its general plane so that each successive portion of the fabric is subjected to repeated flexings while it is being steamed. This results in minimum residual shrinkage which is uniform in both length and breadth. It is particularly suitable for tubular knitted fabric which has been treated according to BP 673,088 and 708,654 (J.S.D.C., 68 (1952) 370; 70 (1954) 303).

C.O.C.

Removing Hairiness from Synthetic Polymer Textiles

C. Landsman

BP 842,857 (26 Oct 1955)

The yarn or fabric is passed under tension to prevent shrinkage through a narrow concentrated beam of heat rays. The amount of heat applied is such as to cause surface hairs to collapse or melt without harm being done to the main structure. The collapsed hairs are then removed or laid by treatment with a solvent. Finally any remaining collapsed surface hairs are removed by shearing.

C.O.C.

Vinyl Resin-coated BookclothDuP *USP* 2,919,206 (21 Mar 1957)

The cloth is given an undercoating of a butadiene-acrylonitrile copolymer and a compatible vinyl chloride resin and a top coating of a drying-oil-modified alkyd resin, a compatible vinyl chloride resin and an aliphatic monohydric alcohol modified urea-formaldehyde resin. This yields a fabric readily adaptable to normal book-binding operations and which can readily be printed on by normal lithographic processes. C.O.C.

Bonding Polyamides to RubberBASF *BP* 843,377 (Germany 8 June 1957)

Outstanding adhesion between polyamide fibres and rubber is obtained by use as bonding agents of a mixture of 80–40% of a 10–20% aqueous solution of a resorcinol-formaldehyde condensate (1:2 to 2:1 mol.) and 20–60% of a 20–60% aqueous dispersion of a butadiene-styrene-*N*-vinylimidazole or *N*-vinylcarbazole condensate (30–70% : 67–20% : 3–10%). C.O.C.

Coated FabricsDunlop Rubber Co. *BP* 846,548 (12 May 1956)

Fabric is passed close to opposite sides of an elongated rectangular orifice of a heated die through which a plastic composition is extruded on to and into the surface of the fabric. The fabric is unconfined adjacent the orifice. C.O.C.

Coating Sheet Material with Polyesters

Goodyear Tire & Rubber Co.

BP 846,369 (U.S.A. 21 Feb 1958)

A solid sheet of polyester resin is heated and thinned down and then laminated to a base by heat and pressure. C.O.C.

Impregnating Clothing to Impart Protection Against Mustard GasU.S. Secretary of War *USP* 2,918,395 (12 Feb 1942)

Use of a vinyl polymer, particularly Vinylite A (CCC) with dibutyl phthalate as plasticizer, as binder when impregnating with bis-2,4,6-trichlorophenyl chloroarsine, imparts good protection against mustard gas and like vesicants. The fabric does not shrink during treatment and is not rendered tacky or sticky. The finish is resistant to storage and repeated washing. C.O.C.

Sprinkling Powder on Web or FoilsC. Dett *BP* 845,667 (Germany 22 June 1956)

The powder is led from a container by a conveyor to the upper surface of the web which has previously been coated with adhesive. The web is then displaced so that its upper surface becomes the lower surface and so that any of the powder falling off it is returned to the conveyor by any means other than via the container. Suitable apparatus is described. C.O.C.

Backing Carpets and RugsBritish Oxygen Co. *BP* 845,661 (11 Apr 1957)

A mixture of synthetic or natural rubber with an aqueous dispersion of poly(vinyl acetate) or a copolymer containing < 50% of vinyl acetate is used. There are 0.5–5.0 parts by wt. of polymer per part of rubber. The rubber may be powder, granular, fibrous or any other subdivided form. C.O.C.

Size Box (I p. 691)

Heat-cleansing and Setting of Fibreglass Fabric (I p. 691)

Progress in Antistatics for Textiles (III p. 692)

Organic Catalyst for Crease-resist Finishes on Viscose Fabrics (III p. 692)

Organopolysiloxane Coating Compositions (III p. 692)

Some Physical Properties of Chemically Finished Viscose Rayon Filament Yarns and Fabrics (VI p. 702)

Dyeing and Finishing of Polyester-Wool Fibre Mixtures (VIII p. 705)

Medium-density Polyethenes in Coatings for Paper (XI this page)

Dimensional Stabilisation of Cellulose Materials (XI p. 710)

4-Nitrophenyl Esters as Leather Fungicides (XII p. 710)

Plasticisers and Polymers Derived from Fats (XIII p. 711)

Comments on the Article—Testing the Wet-creasing-angle according to the Monsanto-Quehl Method (XIV p. 712)

XI—PAPER AND OTHER CELLULOSIC PRODUCTS**Enzymic Degradation of Cellulose**F. Opderbeck and G. Wörner *Papier*, 14 (1960) 131–137
Chem. Abs., 54 (25 July 1960) 14679

Study of the enzymic degradation of a sulphite pulp that had been beaten without any previous drying. The cellulose used was obtained from *Aspergillus niger*. Enzymic attack occurred on lateral planes formed during beating. The greatest accessibility to attack occurred when the alkaline liquor caused complete swelling of the intercrystalline regions of the cellulose. 50 references. C.O.C.

Effect of Pyran Ring upon Acid Hydrolysis of CelluloseV. I. Ivanov, N. Ya. Lenshina, and V. S. Ivanova
Izvestiya Akad. Nauk S.S.S.R., otдел khim. nauk, No. 6 (June 1960) 1136–1138

A comparative investigation of the stability of glycosidic linkages in cellulose, dialdehyde-, dicarboxy-, and dihydroxy-cellulose has been carried out in *N*-HCl at 20°C. (24 hr.) and 98°C. (2 hr.). The stabilising action of the pyran ring on the 1,4-glycosidic linkage is superior to that of, say, carboxyl groups in the α -position. G.J.K.

Preparation of Sulphite Viscose Cellulose

L. E. Akim, T. G. Bamdas, N. A. Mel'chakova, and S. L. Talmud

Zhur. priklad. khim., 33 (Aug 1960) 1867–1874

Optimum conditions in the preparation of viscose cellulose entail fractionating unbleached cellulose fibres by their lengths and removing the short fractions (2–10%), and introducing oxidation inhibitors (1% sulphate lignin) and surface-active agents during the hot alkaline scour. This yields high-quality cellulose (α -cellulose content > 92%) and decreases markedly chemical losses of the fibre during hot alkaline scouring. G.J.K.

Optical Rotatory Dispersion Studies on Polysaccharides. II—Conformation of Partially Methylated Cellulose in Solution

W. B. Neely

J. Amer. Chem. Soc., 82 (20 Aug 1960) 4354–4357

Optical rotatory dispersion techniques have been used to examine soln. of partially methylated cellulose having mol. wt. ~ 35,000 and a D.S. methoxy 1.8. The complex dispersion exhibited by certain soln. demonstrated that aggregation was occurring particularly at elevated temp. and was prevented below 10°C. Formation of aggregate was shown to be concn. dependent and attributed to rupture of bound water layer at higher temp. allowing association of methylcellulose molecules to give insoluble sheet-like structures. F.J.

Effect of Surfactants on Swelling and Gel Properties of Wheat Starch

R. Collison, J. D. Campbell, and G. A. H. Elton

Chem. and Ind., No. 40 (1 Oct 1960) 1230–1231

The extent of swelling of starch in water and aqueous solutions of ionic and non-ionic surfactants has been measured microscopically on individual starch granules. Ionic surfactants increased the degree of swelling, especially above 75°C., whereas non-ionic surfactants did not have much effect. An assessment of the degree of swelling from sedimentation volume experiments showed that addition of certain surfactants reduced the volume of a swollen starch sediment. It is suggested that the discrepancies between these two observations is due to the fact that the presence of the surfactant reduces the tendency of the starch granules to flocculate, with the result that although the size of the particles is increased they can in fact pack into a smaller volume. The presence of surfactants in gels containing 17% starch was found to increase the elasticity; results showed that the elasticity is governed by, among other factors, the extent of intergranular adhesion and that surfactants reduce this intergranular adhesion. Granules swollen in solution of surfactants were shown to be more nearly spherical than those swollen in water. P.G.M.

Medium-density Polyethenes in Coatings for Paper

C. F. Inig and J. F. Morris

Fibres & Plastics, 21 (Aug 1960) 228–229

Extruded coatings of medium-density polythene on paper are superior, weight for weight, to those using

low-density polythene, in relation to grease-proofness, resistance to water-vapour transmission, and abrasion resistance. Coating weights may be reduced to a level at which the higher cost of the medium-density polymer is more than offset. J.W.D.

PATENTS

Dewatering Travelling Paper Webs

Stiftelsen Pappersbrukens Forsknings Institut

BP 847,319 (Sweden 17 July 1957)

Water squeezed out of the wet travelling web is carried through the nip of the press by a mat made of rubber or plastic having holes, cavities or pores of < 2 mm. diameter. The water is released from the mat by centrifugal force and discharged clear of the web. The mat may also be made from open-mesh fabrics or woven from non-absorbent materials. R.A.

Starch-coated Paper of Good Wet-rub Resistance

American Cyanamid Co. USP 2,918,438 (11 Apr 1956)

Adding a little of a water-soluble cationic thermosetting polymethylolcarbonyl polyazoalkane resin to a mineral pigment-starch coating composition much improves the wet-rub resistance of the coated paper. C.O.C.

Dimensional Stabilisation of Cellulose Materials

Upcon Co. BP 846,098 (U.S.A. 20 Oct 1955)

Cellulose material is dimensionally stabilised to varying humidity condition by impregnation with (a) an organic compound containing a carboxyl group and at least one other carboxy and/or alcoholic hydroxyl group, this compound having been at least partly neutralised with (b) an organic basic nitrogenous compound of > 1 C and at least one OH group attached to C. 105 examples are given. C.O.C.

Phthalocyanine Dyes for Paper (IV p. 698)

Rot- and Insect-proofing of Cellulose (X p. 708)

Coating Sheet Material with Polyesters (X p. 709)

Sprinkling Powder on Webs or Foils (X p. 709)

XII—LEATHER; FURS; OTHER PROTEIN MATERIALS**4-Nitrophenyl Esters as Leather Fungicides**

S. Dahl and A. M. Kaplan

J. Amer. Leather Chem. Assoc., 55 (Sept 1960) 480-500

It has previously been assumed that 4-nitrophenyl derivatives are highly fungitoxic only when they contain free phenolic OH groups; it is now shown that, under the warm moist conditions that favour mildew attack, 4-nitrophenol is liberated through hydrolysis. The non-carbonate esters and mixed carbonates such as the bis-carbonates are colourless, less water-soluble than the free nitrophenols, and probably non-toxic. Thus, as long as they remain stable, they do not have many of the objectionable features of the nitrophenols. Non-toxic material is thus converted to fungitoxic under appropriate conditions. Hydrolysis rates of 10 esters (including acetate, propionate, chloroacetates, carbonates, and bis-carbonates) in aq. *p*-dioxan at pH 3 and 40°C. varied 7000-fold but effectiveness of the esters as leather fungicides showed only small variation. Derivatives of 2-chloro-4-nitrophenol were more effective than those of 4-nitrophenol, corresponding exactly with the relative potency of the parent compound. Even though 2-chloro-4-nitrophenol appears to be more susceptible to loss from leather, during exposure to mildew-promoting conditions, it prevents mildew at lower dosages, at least temporarily. 2-Chloro-4-nitrophenyl chloroacetate showed the smallest loss after a 5-month laboratory storage. J.W.D.

States of Aggregation of High-molecular Compounds VII—Effect of Temperature on Keratin

R. I. Feldman

Kolloid. zhur., 22 (May-June 1960) 351-356

The effects of heating and cooling, under varying humidity conditions, on keratin have been investigated dilatometrically, and coefficients of linear expansion, transition points, degree of contraction, and hysteresis effects measured. The state of aggregation of keratin is largely determined by the sorbed moisture content of the material as well as by its prehistory, i.e. previous states and kinetics of their changes. G.J.K.

PATENTS

Water-repellent Leather

Henri Wanquiez BP 847,832 (France 23 Mar 1956)

Treatment of tanned leather with an amine containing an aliphatic chain of 8-22 C imparts good water-repellency. The process is particularly applicable to leather tanned with Zr or with a vegetable and/or synthetic tanning agent. C.O.C.

Water-proofing Leather

Nopco Chemical Co. BP 850,726 (U.S.A. 11 July 1958)

Leather is water-proofed without darkening or discolouring it and without adversely affecting its permeability to air and water vapour, by impregnating the tanned leather with an aromatic hydrocarbon solution of Al isopropoxide and with an aromatic hydrocarbon solution of an aliphatic monocarboxylic acid containing a C_{12-21} chain and then rinsing with an aromatic hydrocarbon solvent. C.O.C.

Resin Finishes for Leather

ICI BP 850,390 (26 Apr 1957)

Leather is treated with a plasticised aqueous dispersion of a polymer or copolymer of < 1 acrylic or methacrylic ester (the plasticiser containing a sulphonamide group, as in *N*-ethyltoluenesulphonamide) and then with HCHO. The polymer may contain $< 50\%$ of other polymerisable ethylenically unsatd. monomers, e.g. vinyl esters, styrene, butadiene, and the dispersions are prepared by known methods, preferably by adding the emulsified plasticiser to a hot aq. dispersion of the polymer. The finish is notably free from the usual defects of known finishes of this type, e.g. migration and drying out of plasticiser, stickiness of surface, poor fastness to wet and dry rubbing, and artificial appearance. The plasticising dispersion may also contain, e.g. colorants, wax, etc. A.T.P.

Reaction of Bromine Water with Wool Keratin (VI p. 702)

XIII—RUBBER; RESINS; PLASTICS**High Polymers**

Maldwyn Jones Trans. I.R.I., 36 (Aug 1960) 130-176

Fifteenth Foundation Lecture of the I.R.I. A review including consideration of the production of high polymers during the past twenty years, the history of polymerisation, the physical nature of polymers and the effects of variations in structure on polymer properties, processing and thermal history of polymers, factors influencing the rubber-like state, and polymer blending. W.R.M.

Effect of Molecular Weight on Fluorescence of High Molecular Compounds

V. F. Gachkovskii Doklady Akad. Nauk. S.S.S.R.,

133 (21 Aug 1960) 1358-1360

Fluorescence spectra of various polymers, with and without conjugation, have been examined. Increase in the degree of polymerisation brings about general decrease in intensity of fluorescence. At the same time the peak in a broad violet-blue band is displaced towards the longer wavelength. This effect occurs in both conjugated and unconjugated polymers, but is considerably less pronounced in the latter. L.S.L.

Aspects of Rubber-Textile Adhesion

G. M. Doyle Trans. I.R.I., 36 (Aug 1960) 177-194

Latex/resorcinol-formaldehyde adhesives for bonding textiles to rubber are generally prepared by condensation under alkaline conditions. Bond strengths of treated textiles are closely related to average number of available reactive sites per resorcinol unit, in the resins formed at the time of application. A further condensation of resin may take place during subsequent processing of textile, number of reactive sites which ultimately determines bond strength is that at time of vulcanisation. Resin may also be formed during vulcanisation of cord-rubber assemblage. Again bond strength is related to resin composition. M.T.

Microscopic Examination of Rubbers, Plastics, and Fillers

M. Stephens and N. H. Langton

Plastics, 25 (Aug 1960) 329-332

Review of some specialised techniques (some hitherto unpublished) in the preparation of powders, particles milled into rubber, fibres (both superficially and in

section), and latices, for examination by light- or electron-microscopy. There are 11 photomicrographs and electron micrographs. J.W.D.

Analysis and Testing of Plastics

G. C. Ives *Fibres & Plastics*, 21 (July 1960) 205-209

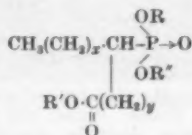
A review of new methods for the quant. determination of the elements, identification of chemical types, and the evaluation of mechanical properties, together with methods of non-destructive testing, thermal and electrical properties, and problems of accelerated ageing. There are 24 references to other literature. J.W.D.

Plasticisers and Polymers Derived from Fats

W. C. Ault

J. Oil & Col. Chem. Assoc., 43 (Sept 1960) 631-639

Plasticisers derived from hydroxystearic acids are briefly discussed; they are of limited value. Epoxidised fats and their derivatives have become important as secondary and primary plasticisers for polymers such as polyvinyl chloride (PVC) upon which they also have marked stabilising action. Fatty derivatives containing phosphorus-carbon bonds are potentially valuable as plasticisers, especially the 9,10-dialkylphosphonostearates—



where $x = 7$ or 8 , and $y = 8$ or 7 . These have low migration loss and impart good low-temperature properties to PVC. Vinyl stearate has been prepared and its homo- and co-polymers have been commercially produced and studied. Long-chain alkyl acrylates and vinyl epoxy-stearate have been investigated. Further new polymers have been prepared by the condensation of epoxidised oils with phthalic anhydride in the presence of organic bases. J.W.D.

Block Condensation of Polyethylene Terephthalate and Polyesters

P. Kresse

Faserforsch. und Textiltech., 11 (Aug 1960) 353-359

Interchange reactions taking place in the melt between polyethylene terephthalate and a number of polyesters are examined. Factors affecting the rates of the reactions are discussed. Shortened co-condensation leads to the formation of block polyesters which can be spun into fibres with improved dyeing properties. Polyethylene hexahydroterephthalate is especially useful as a component of a block polyester. W.R.M.

Dry-colouring Polypropylene

R. A. Charvat

Fibres & Plastics, 21 (July 1960) 196-197, 210

Difficulties in the dry-colouring of polypropylene are largely overcome by the use of hot-cut pellets and by the introduction of a spherical venturi plate in the counterbore at the rear of the nozzle of an injection moulding machine; this latter promotes turbulence. J.W.D.

PATENTS

Thermoplastic Sheeting of Plain or Variegated Colour

Congoleum-Naim

USP 2,917,781 (19 Mar 1958)

Method and apparatus for producing flexible smooth sheeting, particularly of thermoplastic vinyl resin, of either plain or variegated colour, e.g. a jaspé or marbled effect. C.O.C.

Quick-curing Linoleum Composition

Armstrong Cork Co.

USP 2,918,441 (25 June 1950)

Addition of an alkali metal or alkaline earth metal salt of a monomeric aliphatic hydrocarbon-substituted poly-alkylol phenol much increases the curing rate of a linoleum cement containing an oxidised drying oil and resin. C.O.C.

Dull or Matt Surface on Polyethylene Terephthalate Film

ICI

BP 843,850 (29 Nov 1957)

The film is treated with aqueous NaOH or, preferably, KOH, e.g. with 50% aqueous KOH at 120-130°C. for 1 min. C.O.C.

Entropy Stress Study of Various Textile Fibres (VI p. 702)

Pigmented Polyesters (VI p. 703)

Stable Dispersions of Pigments in Polyesters (VI p. 703)

Sprinkling Powder on Web or Foils (X p. 709)

Infrared Spectroscopy of Fibre-forming Polymers (XIV

p. 712)

XIV—ANALYSIS; TESTING; APPARATUS

Tentative Standards for Testing of Textile Auxiliaries. 18th Communication—Determination of Protective Power of Surface-active Substances

G. V. Hornuff

Melliand Textilber., 41 (Sept 1960) 1147-1152

To assess the protective (anti-flocculating) power of a surface-active compound the quantity of the auxiliary just sufficient to prevent precipitation of a vat acid is determined. A spot test on filter paper is used. Detailed instructions are given for the preparation of the required solutions and for carrying out the test. The same principle is used to determine the protective power of an auxiliary in the case of re-oxidised vat dyes and Naphtol AS combinations. W.M.

Measurement by the Opal-glass Method of Absorption Spectra of Dye Adsorbed on Fabrics

T. Tachibana and M. Okuda

J.S.D.C., 76 (Oct 1960) 588

Colour Reactions given by Sugars and Diphenylamine-aniline Spray Reagents on Paper Chromatograms

R. W. Bailey and E. J. Bourne

J. Chromatography, 4 (Sept 1960) 206-213

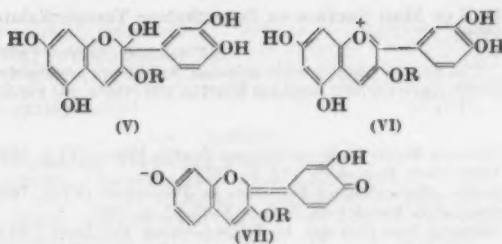
The specific colour reaction (bright blue) shown by a soln. of diphenylamine and aniline containing phosphoric acid when sprayed on to spots of disaccharides containing a glycosidic link at the 4-position of the reducing monosaccharide unit (e.g. maltose, cellobiose and lactose) followed by controlled heating at 80°C. for 5 min. has been further investigated. When reagents are applied as two successive sprays, i.e. diphenylamine, followed by aniline, specific colour reactions are obtained with all aldohexoses and reducing aldohexose disaccharides (other than those containing 1-4 link) and some ketoses. Distinction between L-sorbose and D-fructose is clear. Possible reactions involved in the formation of colours are discussed. F.J.

Zone Electrophoresis of Anthocyanins

P. Markakis

Nature, 187 (24 Sept 1960) 1092-1093

Typical anthocyanins extracted from cherries (I), strawberries (II), plums (III), and rose petals (IV), when placed within an electric field applied across filter-paper or cellulose powder, moved either to the anode or cathode depending on pH of the electrolyte soln. Pigments of (I) were extracted with 70% ethanol, of (II) with n-butanol and of (III) and (IV) with methanol. Anthocyanins were applied to paper in form of a cone. 1% aq. HCl soln. and buffered at various pH values. Voltage gradients of 7-8 v. cm.⁻¹ applied over 5-10 hr. in case of paper and 10-15 v. cm.⁻¹ in case of cellulose powder were sufficient to achieve separation. Two pigments, A and B, isolated from (I) were found to have zero apparent electrophoretic mobilities at pH 6.9 and 6.0, respectively. These values appeared to be the isoelectric points. It was confirmed by absorption spectra that the point of minimum light absorption (in region 500-530 mμ) corresponded to the pH values of the isoelectric points. A and B were characterised as mecocyanin and antirrhinin respectively. In the latter it is suggested that the pseudobase (V) may be the dominant form at the isoelectric point. At pH < 6.0 (VI) should probably predominate and at higher pH the negatively charged tautomers of (VII) are dominant. Paper electrophoresis is recommended as a method for separation, purification and characterisation of anthocyanins.



R = Rhamnoglucoside

F.J.

Gradient Method for Determining Specific Gravity of Synthetic Polymer Fibres

N. V. Mikhailov, N. N. Zav'yalova, and V. O. Gorbacheva
Khim. Volokna (1) (1960) 19-22
Chem. Abs., 54 (25 July 1960) 14697

A gradient column containing two miscible liquids of different density is placed in an air thermostat at 25-30°C. Glass ampules containing dried samples are carefully broken up in a porcelain dish containing the deaerated lighter of the two liquids. The samples and liquid are then transferred into the column and their positions measured. The density is then read from a calibration curve obtained by use of glass beads of known density. C.O.C.

Determination of Alkali in Bleaching Baths Containing Hydrogen Peroxide

AATCC Tentative Test Method 98-1960

Amer. Dyestuff Rep., 49 (22 Aug 1960) P 607

Determination of Non-cotton Content of Bleached Cotton Textiles

AATCC Tentative Test Method 97-1960

Amer. Dyestuff Rep., 49 (22 Aug 1960) P 606

Influence of Sulphonate Group Orientation on Light Fastness of Acid Wool Dyes

C. H. Giles

J.S.D.C., 76 (Oct 1960) 587-588

Comments on the Article—Testing the Wet-creasing-angle according to the Monsanto-Quehl Method

P. Vogel

Melliand Textilber., 41 (Sept 1960) 1152

A method of measurement is proposed which is essentially identical with the Tootal method, differing from it only in the use of the Monsanto reading device. The author concludes that the Tootal method for determination of the wet-creasing angle is superior to the Monsanto-Quehl method as the apparatus is simpler and less time and work are required to complete a test. The accuracy of the Tootal method is adequate and the Monsanto-Quehl method does not seem to improve on it. W.M.

Infrared Spectroscopy of Fibre-forming Polymers

C. Ruscher and R. Schmolke

Faserforsch. und Textiltech., 11 (Aug 1960) 383-390

The principles of the method are briefly discussed and special methods of studying thin films and single fibres are described. Some details of the use of polarised infrared radiation in dichroic studies are given. There are 221 references. W.R.M.

Apparatus for Measurement of Gelation Times

W. J. Ross and C. H. Wright

British Plastics, 33 (Aug 1960) 378-379

An account of the investigation of the performance and the improvement of an instrument (Techné) based upon an oscillating plunger. There are two diagrams and a photograph. J.W.D.

Complexometric Determination of Copper in Cupriethylenediamine Solutions

J. Sára and W. Berndt

Svensk Papperstidning, 63 (31 Aug 1960) 528-529 (in German)

Urotropin, recommended as a buffer in an earlier publication (*ibid.*, 61 (1958) 353-355) is replaced by sodium acetate and the weakly acid soln. is titrated with 0.05 M. Komplexon III (EDTA) using xylenol orange or methyl thymol blue as indicator. R.A.

PATENTS

Colorimeter

Technicon International

BP 846,171 (U.S.A. 5 June 1957)

A colorimeter for the photoelectric viewing of a stream of liquid samples. C.O.C.

Absorption of Ethylenediaminetetra-acetic Acid Complexes of Zinc, Cadmium, Zirconium, and Niobium by Anionic Exchangers (III p. 691)

Diphenylamine as a Coupling Agent (IV p. 694)

Antistatic Finish and its Problems (X p. 707)

Oil-repellent Finish with Fluorine Compounds (X p. 707)

Effect of Molecular Weight on Fluorescence of High Molecular Compounds (XIII p. 710)

Microscopic Examination of Rubbers, Plastics, and Fillers (XIII p. 710)

XV—MISCELLANEOUS

The Use of Colour in Cosmetics

D. F. Anstead

J.S.D.C., 76 (Oct 1960) 573-578

Employment Policy

D. P. T. Jay *J. Textile Inst.*, 51 (Aug 1960) P 423-P 433

Discusses general economic problems facing the U.K. Figures for the comparative rise in production, in gross national product, in domestic fixed capital formation and in exports over the last five years indicate that few European countries have shown smaller increases than the U.K. If tendencies continue, Britain's economic, political, and military strength will decline relative to that of Russia, Germany, France, Japan, and even Italy. It is claimed that decline could be stopped by intelligent planning of geographical distribution of industry and labour and by increasing investment. M.T.

Management in the Second Industrial Revolution

Sir W. Puckey

J. Textile Inst., 51 (Aug 1960) P 450-P 459

The characteristics of the "Second Industrial Revolution" are the growing importance of men in a machine age, and the rapid rate of change in the materials and machines themselves. The contributions of (a) machine sciences, (b) social sciences, and (c) managers to management are discussed separately. The manager's responsibility for maintaining (a) technological strength, (b) organisational strength, and (c) managerial succession are considered to be the most important for the future. M.T.

"How Long is Your Shadow?"

M. E. Heard

Canad. Text. J., 77 (16 Sept 1960) 25-27, 29

Claims that success of an organisation depends primarily on manager—"an organisation is the lengthened shadow of one man" (Emerson). Matters of importance are the attitude and values of the manager, development of confidence, and willingness to discuss problems. It is essential to develop a climate of approval and encouragement. Integrity is vital and the manager must show confidence in his employees. The importance of meetings and reports is stressed and a four-year course in report writing is advocated for all college graduates. M.T.

Science of Clothing Hygiene—Past and Present

E. T. Renbourn

J. Textile Inst., 51 (Aug 1960) P 469-P 485

After discussing early ideas of the hygienic value of clothing, the author reviews recent investigations of the hygiene and physiology of textiles. Laboratory tests are then discussed and emphasis is laid on the difficulty of extrapolating laboratory results on samples of cloth into the physiological properties of the materials worn as garments. Finally, physiological evaluation of clothing systems is described. 84 references. M.T.

Psychology of Textiles

E. Diehter *J. Textile Inst.*, 51 (Aug 1960) P 486-P 498

An account of the motives underlying choice of the different fibres by the consumer, the "misery of choice" resulting from the wide variety of fibres available, and means for reducing consumer fears and resolving misery of choice. M.T.

Early Days of Dyeing (VIII p. 704)

Biological Perspectives in Textile Research (X p. 707)

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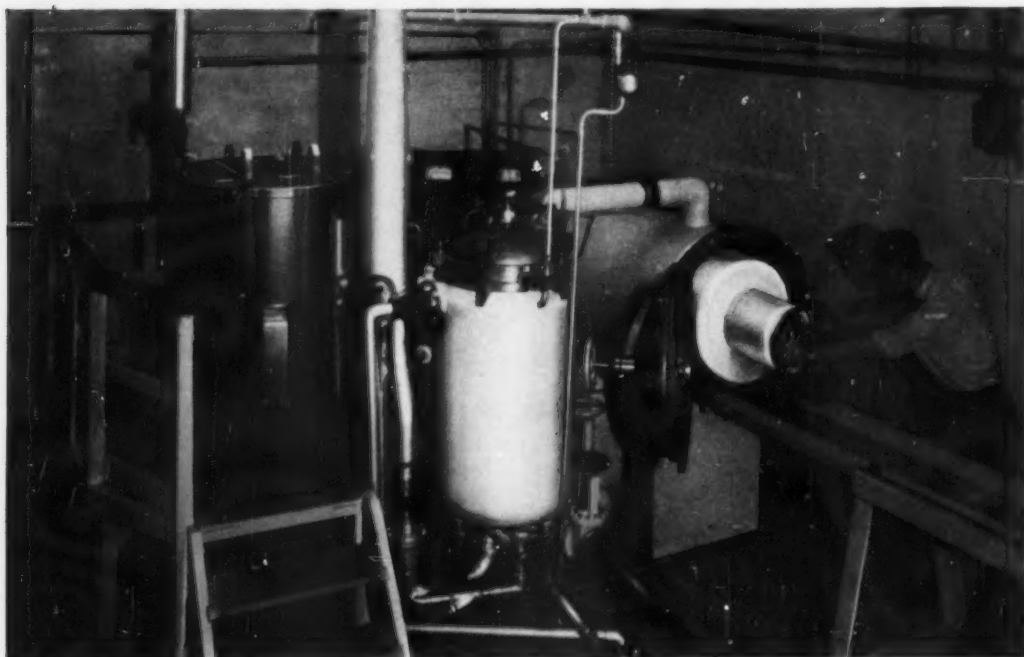
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Advertisements relating to APPOINTMENTS VACANT, APPOINTMENTS WANTED, and MISCELLANEOUS are invited for insertion on this page. Advertisements of Appointments Wanted are gratis to members, but must not exceed twenty-four words.

All enquiries relating to Advertisements should be addressed to THE GENERAL SECRETARY, THE SOCIETY OF DYERS and COLOURISTS, DEAN HOUSE, 19 PICCADILLY, BRADFORD 1, YORKSHIRE.

Replies may be addressed Box—, THE SOCIETY OF DYERS and COLOURISTS, DEAN HOUSE, 19 PICCADILLY, BRADFORD 1, YORKSHIRE, where all communications relating to these Advertisements are treated in strict confidence.

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A TEXTILE TECHNICIAN is required for technical service work dealing with enquiries on detergency. The position involves carrying out experimental and other work preparatory to writing reports in answer to customers' queries and involves some travel in the U.K.

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Applicants should have sound experience of textiles and a knowledge of detergency will be an obvious advantage. Training will, however, be given to otherwise suitably qualified men.

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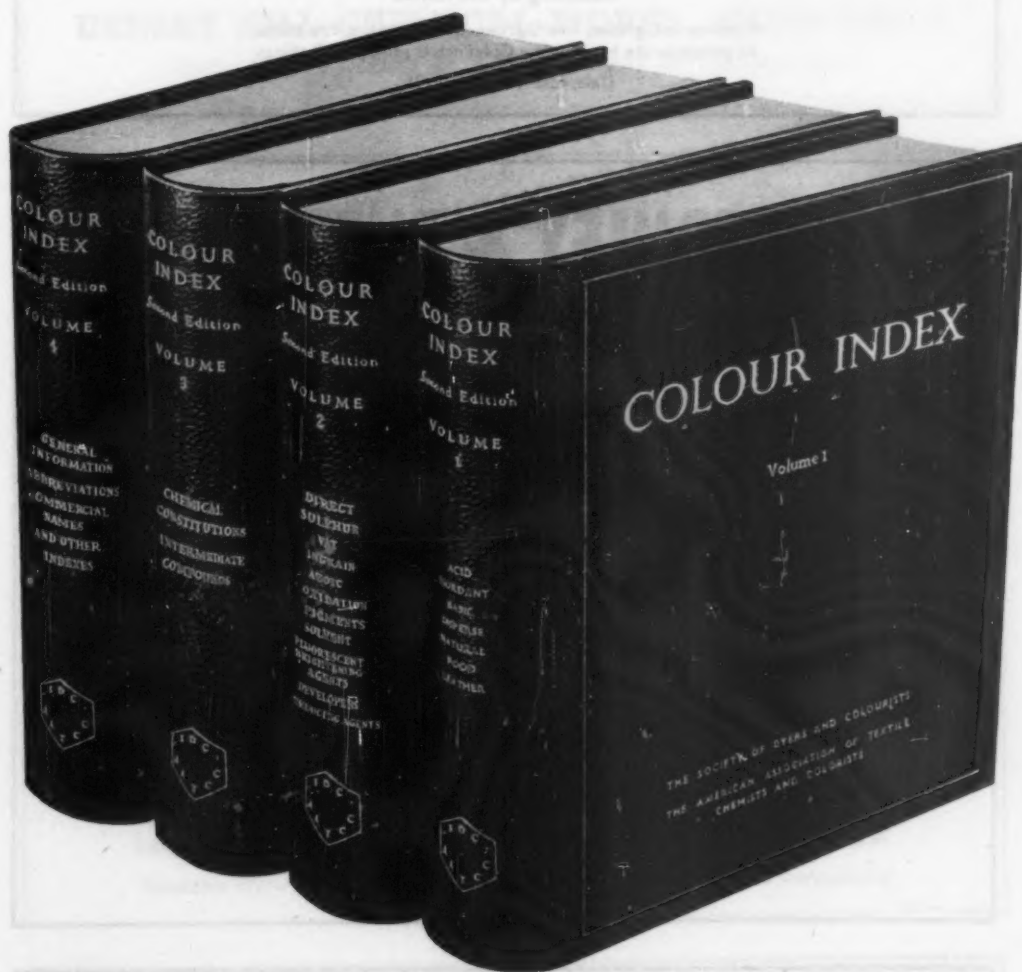
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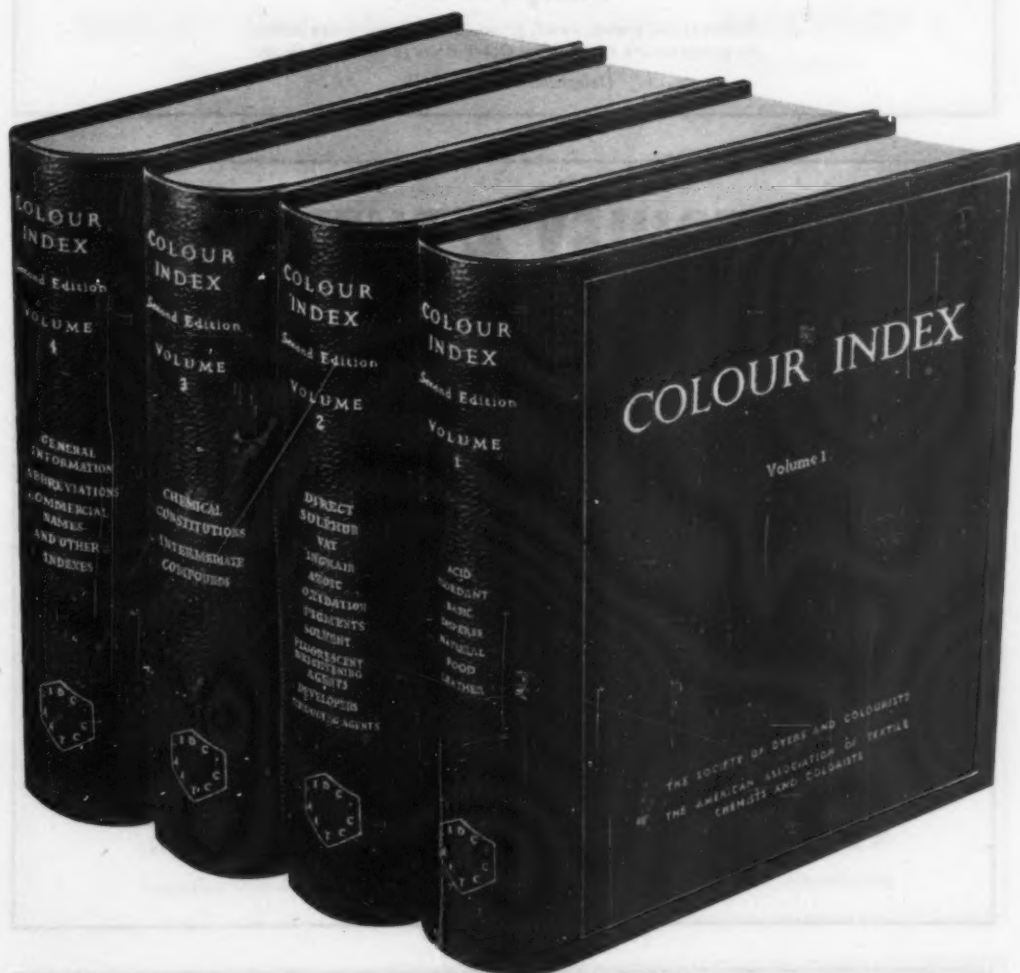
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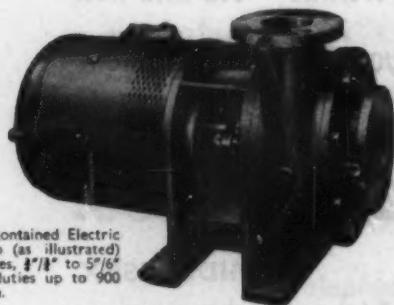
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